CIGRE Paris Session 2026

Provisional Technical Programme

See the list of Session Papers based on accepted synopses.

Kindly note that Session Papers selection is still under process. Therefore, the list may evolve. Final selection results will be on 11th May 2026.

B1 INSULATED CABLES

B1 PS1 - Future cable systems and innovative cable applications

ID: 10117
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications

Universal Transition Joint 150kV for XLPE cable on the Belgian Grid

B. MAMPAEY[1], P. LEEMANS[1], J.-B. ZIMER[1], T. CAPELLE[2], D. LEEMANS[2], A. AIT AMAR[2]
[1]Elia, Belgium; [2]Nexans, Belgium

ID: 10281
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Superconducting Cable, Resistive Cable, Grid Hierarchy, Right of Way, Transmission power capacity, Urban Grid, On-shore, Off-shore, Grid Congestion, CableGnosis

Requirements for Feasibility of Superconducting Cables as studied in the CableGnosis Project

R. ROSS[1], A.-J. DE GRAAF[1], R. ZUIJDERDIJN[2], C.-E. BRUZEK[3], M. YAZDANI-ASRAMI[4], T. SPINA[3], W. SONG[4]
[1]IWO; [2]TenneT TSO; [3]ASG Superconductors S.p.A.; [4]University of Glasgow

ID: 10282
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Experiments, MVAC cable systems, thermal monitoring, time-domain reflectometry

Time-domain reflectometry based temperature monitoring on MVAC cables: experience from field and laboratory experiments

A. JIMÉNEZ-ROSALES[1], D. WOLDENDORP[1], A. KOLMUS[1], N. DE VISSER[1], J. DE LANGE[1], S. RIEKEN[1,2]
[1]Alliander N.V; [2]IMAPP, Radboud University

ID: 10320
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Aluminium conductor; underground cables; high voltage transmission; total cost of ownership; cable accessories; environmental impact; 150 kV cable system

Introduction of 4000 mm2 AlMil conductor in HV cable systems

R. ZUIJDERDUIN[1], J. SMIT[1], A. KARAMPEKIOS[1], M. FARAGALLA[1], A. TSEKMES[2], F. MIDDEL[2], T. KOLTUNOWICZ[2], R. BODEGA[2]
[1]TenneT TSO; [2]Prysmian

ID: 10325
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Submarine, immersed in water, buried, seabed

An Analytical Curent Rating Calulation Method for Submarine Cables Completely Immersed in Water or Partially Buried in the Seabed

X. JIAO, E. FERNANDEZ, J. PATRICK
ELEK Software

ID: 10426
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications

Insulated Cables Statistics 2023

R. WHEATLAND[1], F. WAITE[2], K. O. ASKLUND[3], J. FUJIHARA[4], P. VAN DER WIELEN[5], S. D. MIKKELSEN[6], N. HAMPTON[7], A. WOOLES[8]
[1]Convener SC B1 Reliability Advisory Group (RAG) - Australia; [2]Member - United Kingdom; [3]Member - Norway; [4]Member - Brazil; [5]Member - The Netherlands; [6]Member - Denmark; [7]Member - USA; [8]Member - New Zealand

ID: 10678
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Construction - Design Coordination - Cable Systems - Transmission - Civil Engineering - Electrical Design - Urban

Electrical and Civil Engineering Challenges for Underground Cable Installations in Urban Settings

E. {. C. BASCOM III[1], C. PETROCELLI[2], D. L. TAYLOR JR[2], R. ADAMS[2]
[1]Electrical Consulting Engineers, P.C., United States of America; [2]Dewberry Engineers Inc., United States of America

ID: 10679
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Transmission - XLPE - Retrofit - Pipe-Type - HPFF - Replacement - Life Cycle

XLPE Cable Retrofit for Pipe-Type Presents Engineering Challenges

E. {. C. BASCOM III[1], A. SMITH[2], S. ASHKOURI[2], P. WALL[2], E. AL-SIBAI[2]
[1]Electrical Consulting Engineers, P.C., United States of America; [2]National Grid, United States of America

ID: 10699
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Superconducting cables, MVDC, high-temperature superconductors (HTS), offshore cables, Resistive Fault Current Limiter

High-power medium-voltage superconducting cables for Europe's energy transition

A. ALLAIS[1], B. WEST[1], N. LALLOUET[1], K. ALLWEINS[1], M. GAMMELSAETER[2], A. MORANDI[3], M. SIMONAZZI[3], E. GUERRA[3], J. CANDIDO[4], D. O DONOVAN[5], F. GOMORY[6], E. SEILER[6]
[1]NEXANS; [2]SINTEF; [3]University of Bologna - Italy; [4]WAVEC; [5]SUPERNODE; [6]IEE Brastislava - Slovakia

ID: 10701
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Dynamic cable – Floating offshore wind, Distributed fibre optic sensing, DAS, DSS, Subsea cable, Condition monitoring, Dynamic loading, Lazy wave, Offshore instrumentation

Dynamic cable monitoring using Distributed Fiber Optic Sensing

S. RAKOTOARIVONY[1], P. CLEMENT[1], M. ROULET[2], A. MAISON[2]
[1]FEBUS Optics; [2]France Energies Marines

ID: 10720
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Superconducting - Electromagnetic Transient - Data Center - Simulation - Modeling - Experimental Model Validation

EMT Modeling and Analysis of HTS Power Cables in Data Center Interconnection

J. ZHAO[1], F. MORICONI[2], K. THOMAS[1], S. ASHWORTH[2], E. GARCIA[2], E. KARACA[2], S. CHRISTO[2]
[1]Elevate Energy Consulting, United States of America; [2]VEIR, United States of America

ID: 10728
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: HVDC, HVAC, Qualification Tests, HV Cable Systems, Cable specification, TOV, Short Circuit current, Submarine, Underground

Towards a Coordinated HV Cable Approach: A TSO-Led Response to the Grid Action Plan - Six European TSOs Launch Collaborative Effort to Support HV Cable Supply Chain

W. BELE[1], R. BONDO[1], F. ESTERL[2], Y. LEROY[3], H. RAJADO[4], G. GENDRE[5], B. LEEMANS[3], Y. BREMART[1], G. DENCHE[4], K. SCHMIDLIN[5], P. MEYER[1], S. GROEGER[6]
[1]RTE France; [2]50hertz Transmission Germany; [3]Elia Belgium; [4]Red Electrica Spain; [5]Swiss Grid Switzerland; [6]Amprion Germany

ID: 10822
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Aluminum conductor, connector, OF cable replacement

Development of 275kV Aluminum Conductor XLPE Cable and Connectors

T. KOBAYASHI[1], Y. IKEDA[1], K. IWASAKI[1], Y. AIHARA[2], Y. KOWATARI[3], C. MICHELSEN[4]
[1]TEPCO Power Grid, Incorporated Japan; [2]TEPCO Holdings, Incorporated Japan; [3]Sumitomo Electric Industries, Ltd. Japan; [4]ReliBond ApS Denmark

ID: 10823
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: HVDC, Cross-linked Polyethylene (XLPE), Submarine cable, Deep water, Armour

Development of DC deep water submarine cables that enable installation along optimal routes

Y. OTAKE, Y. KISHIDA, Y. YOON, H. SAKAKIBARA
Furukawa Electric Co., Ltd Japan

ID: 10824
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Distributed Acoustic Sensing (DAS), Fault Detection, Remote Optically Pumped Amplification (ROPA), Optical Time Domain Reflectometry (OTDR), High Voltage Direct Current (HVDC) submarine cable, Anchor drop detection, Vessel movement identification

Early Detection of External Damage Incidents in Long-Distance Direct Current Submarine Cables

S. YAMAMOTO[1], S. TAKEDA[1], T. SHIMOGUCHI[1], D. BOLOTOV[2], R. ALBRECHT[2]
[1]Sumitomo Electric Industries, Ltd. Japan; [2]AP Sensing GmbH Germany

ID: 10991
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: 245 kV HVAC; Dynamic Cable Systems; Floating Offshore Wind; Mechanical Fatigue Resistance; Offshore Wind Innovation; Subsea Power Transmission

Industry-First Dynamic Cable System Solution at 245 kV

A. VERRILLO
PRISMIAN ITALY

ID: 11146
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: outdoor cable termination, composite housing, dry type, plug-in, energy transition, gas-free, qualification tests

"Development and Qualification of a 420 kV Dry-Type Outdoor Termination"

P. BOFFI
PRYSMIAN

ID: 11167
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: HPFF-cable, transition joint, high-voltage cable, accessory, oil-impregnated insulation, testing

220 kV Transition Joint for Connecting High-Pressure Fluid-Filled (HPFF) Cable and Cross-Linked Polyethylene (XLPE) Insulated Cable

A. FILIPPOV[1], A. SLAVINSKY[1], V. PSHENNOV[2], D. GVOZDEV[3], V. BOLONOV[3], A. KOROLEV[4]
[1]Izolyator-AKS LLC / NRU MPEI; [2]Izolyator-AKS, LLC; [3]PJSC "Rosseti Moscow Region"; [4]PJSC "Rosseti"

ID: 11268
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: controlled switching device, offshore wind farm cable export system, shunt reactor compensation, zero-miss phenomenon

Investigation on Zero-miss Phenomenon in Shunt Reactor Compensated Long HVAC Cable for Offshore Wind Farm

Z. WANG*[1], P. WANG[2], R. ZHANG[1], J. KOTINIITTY[3]
[1]GEV Singapore; [2]GEV Australia; [3]GEV Finland

ID: 11341
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: polypropylene, Insulated cable, theromplastics, catalyst, residues

AC Electrical Characteristics of Polypropylene for Eco-friendly Thermoplastic Power cable

H. LEE, H. JUNG, J. S. SHIN, E. LEE, J. PARK
Hanwha TotalEnergies

ID: 11366
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications

Subsea reactive power compensation for offshore wind

T. LANERYD
Hitachi Energy

ID: 11368
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications

Stresses on crossing third-party assets due to lighting strikes along underground HVDC cable rout

P. SIDENVALL
I2G

ID: 11380
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Partial Discharge, Fibre Optic, Passive Sensors, Very Long Distance, High Voltage Cables

Nobel passive signal acquisition system for PD monitoring of very long cables based on optical fibre

J. ORTEGO[1], I. JARA[1], W. DOMINGOS DE MEDEIROS[2], L. MERINO[2], P. CHAMORRO-POSADA[3]
[1]Ampacimon, Spain; [2]RDT Lumiker, Spain; [3]Universidad de Valladolid, Spain

ID: 11407
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications

Evaluation of modified XLPE for 320 kV HVDC Cable use at elevated Conductor Temperatures

S. KIM, T. LEE, C. KIM, Y. LEE
Hanwha Solutions

ID: 11412
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications

First results from curvature sensor installed in dynamic cable on floating platform

V. RYDÈN
NKT

ID: 11513
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: 110kV; Offshore wind power, Torsion-resistant cable, Ethylene Propylene Rubber, Intelligent Monitoring, service life assessment
Introduction

Research on 110kV Torsion-Resistant Cable for Offshore Wind Power

J. CHEN[1], C. TIAN[1], J. GAO[2], M. WU[2]
[1]Far East Cable Co.,ltd.; [2]Xi'an Jiaotong University

ID: 11666
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Condition Monitoring, Digital Twin, High Voltage Cable Systems, High Voltage Intelligent Solutions, LoRaWAN Communication, Predictive Maintenance

Enhancing the Reliability of HV Cable Systems Through Intelligent Monitoring and Digital Integration Solutions

S. ERDENİZ, Y. HIZAL
Em Elektrik

ID: 11705
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: BIM, Cable, Flexible, High Voltage, Point Cloud Data, TMF, Tunnel, 3D Modelling.

Design of Flexible Cable Installations within Congested Tunnel Systems

D. CAVE, J. SULLIVAN, J. URDANETA, J. OLIVER
BakerHicks Ltd. United Kingdom

ID: 11731
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications

Study on Mechanical Fatigue Loads on Insulation in a Dynamic HVDC Cable

A. TYRBERG
NKT

ID: 11761
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Power Cable, Current Rating, Ampacity

Ampacity Calculations of Complex Underground Cables Arrangements

F. GAUTHIER[1], G. ANDERS[2], H. BRAKELMANN[3], C. APRAEZ[1]
[1]Eaton, Canada; [2]Technical University of Lodz, Poland; [3]BBC Cable Consulting, Germany

ID: 11789
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: arcing models, type tests, cable components

A piecewise approximation methodology to analyse cable arcing fault behaviour and characteristic

A. CUPPEN[1], J. J. M. CUPPEN[2], N.-K.C NAIR[1]
[1]University Of Auckland, New Zealand; [2]Neiding B.V., The Netherlands

ID: 11812
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Distributed Electrical Sensing (DES), Distributed Temperature Sensing (DTS), Fibre Bragg Grating (FBG), Passive Sensing, Real-Time Thermal Rating (RTTR).

Improved cable RTTR and early failure detection by combining DTS monitoring with distributed point sensing

S. BLAIR[1], L. GEORGE[1], M. KELLY[1], M. HOSSEINI[1], P. VERNON[1], R. OU[1], N. KROPF[2]
[1]Synaptec UK; [2]Vattenfall Germany

ID: 11824
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: HVDC Mass Impregnated Cable System, Deep water, Type testing

525 kV HVDC Mass Impregnated Cables for 3000 m water depth

L. LERVIK, P. V. LAENGEN, A. SUTHER, B. K. JOHANSEN
Nexans

ID: 11827
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Submarine Cable Installation, Offshore Wind, J-Tubeless, Fatigue Test, System Reliability

Development and Reliability Validation of J-Tubeless Installation Method for Submarine Cables in Offshore Wind Farms

J. CHOE[1], J. LIM[1], Y. JUNG[2], K. AHN[3]
[1]KERI; [2]Taihan Cable&Solution; [3]Hwaseung Corporation

ID: 11834
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: offshore wind, floating wind, dynamic cables, extruded cables, high voltage cable, wet design, high voltage wet design

Qualification of 132 kV wet design XLPE cables

M. BENGTSSON[1], E. OLSEN[1], D. NILSSON[2], R. HUUVA[2], S. HVIDSTEN[3], H. H. SÆTERNES[3], F. MAUSETH[4]
[1]Nexans Norway; [2]Borealis; [3]SINTEF Energy Research; [4]NTNU

ID: 11836
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Monitoring, Modelling, Cable Aging, Edge Integration, DTS, DAS, Vibration, PD

Predictive Modelling of XLPE Cable Systems Using Real-Time Monitoring via Distributed Sensing and Edge Integration in the EASY-DC framework

C. DIKAIAKOS[1], T. LUCIGNANO[1], J. NIEMANN-LARSEN[2], S. V. KJÆR[2], G. MERINO[3], L. MERINO[3]
[1]Statnett; [2]Energinet; [3]Lumiker

ID: 11837
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: HVDC, Cable, Joint, Accessory, Surface Inspection, Quality Control, Algorithm, Database, Installation

Field Experiences with Surface Inspection and Control Algorithms Employed on Extruded HVDC Cable Accessory Installations

E. DOEDENS, S. KJØNIGSEN, T. DRAGESET
Nexans Norway

ID: 11838
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Dynamic cables, technology qualification, testing, numerical methods

Mechanical design of dynamic cables for floating wind – Technology Qualification combining testing and cross section modelling

P. A. EIKREM, G. SKEIE
DNV

ID: 11844
B1 INSULATED CABLES - Full Papers

Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Superconducting cables, MVDC, MgB2, dual / bi-energy power transmission, liquid hydrogen

Hydrogen-cooled superconducting power link

M. GAMMELSÆTER[1], C.-E. BRUZEC[2], A. MARIAN[3], S. HOLE[4], N. LALLOUET[5], A. MORANDI[6], W. REISER[7]
[1]SINTEF; [2]ASG; [3]RIFS Potsdam; [4]ESPCI; [5]Nexans; [6]University of Bologna; [7]VESC

ID: 11845
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Inter Array Cable Rating – Considerations Beyond IEC standards

XLPE cable cores with a new aluminium alloy conductor subjected to ageing in water at high constant temperatures and temperature cycling

J. HØLTO[1], T. A. VE[1], E. H. SWENSEN[1], S. HVIDTSTEN[1], E. OLSEN[2], J. SKAGMEO[2], K. M. BENGTSSON[2]
[1]SINTEF Energy; [2]Nexans Norway

ID: 11846
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: RTTR, DTS, Dynamic Rating, Optimisation, Thermal Modelling, Temperature monitoring, HVAC Submarine cable system

A Practical Approach to Dynamic Operation of the HVAC Submarine Cable System 'Fensfjorden' in Norway

T. LUCIGNANO, J. MATALLANA, H. LUND, D. S. AMUNDSEN, V. MARKHUS
Statnett

ID: 11848
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: 3-core submarine cables, thermal bottleneck, low-loss cable system, single-point bonding, improved cable ratings.

Single End Bonding of submarine 3-core cables – Qualification Testing

E. OLSEN, H. TØMMERBAKKE, M. HOVDE, K. M. BENGTSSON
Nexans

ID: 11849
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Cross-linked Polyethylene – Dielectric Strength – HVDC – Temporary Overvoltage

Dielectric Strength of XLPE Subjected to Temporary Overvoltages of Different Durations

M. RUNDE[1], D. LINHJELL[1], Ø. HESTAD[2], A. MERMIGKAS[1], C. LESAINT[1], K. S. THINN[1], H. H. SÆTERNÆS[1], E. DOEDENS[3], J. I. JUVIK[4]
[1]SINTEF Energy Research; [2]Norwegian University of Science and Technology; [3]Nexans Norway; [4]Statnett

ID: 11902
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Polypropylene insulated cable, 154kV pilot project, Higher admissible current, Eco-friendly

Application Case of Field Experience through Mechnical Constant Test of 154kV Eco-friendly Polypropylene Insulated Power Cables

M. KIM, D. KIM, Y. LEE
ILJIN Electric Co., Ltd

ID: 12007
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: XLPE, HVDC Cables, LCC, VSC, Polarity Reversal, Lifetime, Breakdown, Insulation

Influence of Polarity Reversal on the dielectric strength of extruded HVDC Cables

S. MEMARI[1], U. SCHICHLER[2]
[1]Prysmian; [2]Graz University of Technology

ID: 12231
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Cable, lightning, protection, shield wire, simulation, soil, testing

Protective Measures for Medium-Voltage Cable Systems against Nearby Lightning Strikes to Ground

S. PODKORITNIK[1], R. AHLIN[1], I. KOBAL[1], D. HUC[1], G. MILEV[1], M. SIMON[1], V. DJURICA[1], V. BONČA[2], J. SERDINŠEK[3]
[1]EIMV; [2]Elektro Gorenjska; [3]Elektro Ljubljana

ID: 12398
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications

Transient Performance and Operational Insights of Hybrid 380 kV AC Transmission Systems

M. BOZEK, S. MUELLER- SCHUETZE, W. KRAUSE
TenneT Germany

ID: 12401
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications

Defining Operational Voltage Bands for HVDC Cable Systems in Multiterminal DC Grids: Rationale for Increasing Type Test Base Voltage from 525 kV to 550 kV

T. KARMOKAR[1], A. SACIAK[2], S. PAPENHEIM[3], I. NETT[1], V. TACKENBERG[1], V. BERAK[4]
[1]TenneT TSO GmbH; [2]50Hertz Transmission GmbH; [3]Amprion GmbH; [4]TransnetBW GmbH

ID: 12501
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: 750 kV extra-high voltage AC cable, cross-linked polyethylene insulation, smooth aluminum sheath, corrugated aluminum sheath, type test, pre-qualification test

Development and Standardization of 750 kV Extra-High-Voltage AC Cable System for Large Capacity Renewable Energy Transmission

P. GAO[1], Y. ZHAO[2], F. GAI[1], Y. WANG[2], B. TANG[1], W. LIU[1], T. ZHANG[2], Y. ZHANG[2], J. HOU[3], H. GONG[3], J. GAO[4], L. JIANG[4], L. ZHONG[4]
[1]China Three Gorges Construction Engineering Corporation; [2]Qingdao Hanhe Cable Co.,Ltd.; [3]China Electric Power Research Institute Co., Ltd.; [4]Xi'an Jiaotong University

ID: 12570
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications

Current rating in dynamic cables with corrugated sheath and double wire armour

D. CHATZIPETROS, K. BITSI, D. GKITSOS, P. PARISSIS, A. NEGINHAL, N. P. SAKKAS, V. KANAS, A. I. CHRYSOCHOS
Hellenic Cables Greece

ID: 12571
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications

Thermoelectric performance of a 66 kV Submarine Umbilical Cable Integrating Hydrogen Transmission for Offshore Renewable Systems

P. ZAIRIS, K. BITSI, I. CHALEPLIDIS, K. KOUTRAS, A. NEGINHAL, D. GKITSOS, D. CHATZIPETROS, E. KYRIAKOPOULOU, G. GEORGALLIS
Hellenic Cables Greece

ID: 12590
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications

Real Time Monitoring of Submarine Power Cable Installation Parameters During Free Lay

P. DELIZIS, G. GEORGOPOULOS, A. PYTHAROULIOU
ASSO.Submarine Greece

ID: 12618
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Future cable systems and innovative cable applications
Keywords: Submarine, dynamic, cable, insulation, wet design, offshore, water tree, degradation, lifetime

Assessment of Water Tree Formation in XLPE Insulation Variants to Validate Design of 132 kV Wet-Type Dynamic Cables

C. BARRETT
University of Manchester United Kingdom

B1 PS2 - Recent experience with AC and DC cables, both land and submarine

ID: 10157
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Ampacity - Finite Element Method (FEM) - Pinch Points - Thermal Modeling - Cable

Advanced 3D FEM Modeling for Thermal Management of Underground Cable Systems and Crossings

B. RUTHERFORD[1], A. ROGERS[2], R. EVANS[2], A. HASHIM[2], C. EDWARDS[1]
[1]Burns & McDonnell, United States of America; [2]Dominion Energy, United States of America

ID: 10177
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: TR-XLPE - EPR - Reliability - Expected Life - Remaining Lifetime

Performance Assessment of 35 kV TR-XLPE and EPR Cables Removed from the Same Installation Prior to Failure throughout 40 Years of Service Life

P. BRIGANDI[1], T. PERSON[1], R. AARONS[2], B. RICHARDSON[3], S. WOLBACH[4], D. RAMIREZ-WONG[5]
[1]Dow Wire & Cable, United States of America; [2]Dow Europe, Germany; [3]Richardson Bros. Services, United States of America; [4]Alabama Power Company, United States of America; [5]Georgia Tech/NEETRAC, United States of America

ID: 10257
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: HVAC, 3-core Submarine Cable, Sequence Impedance, Analytical Calculation

Unlocking Accuracy: Improving Analytical Model for Submarine Cable Impedance from 50 Hz to 10 kHz

N. ESCOLANO[1], S. ANILD[2]
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ID: 10283
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: EHVDC cables, Thermal runaway, Modelling, Insulation materials, design criteria

Empirical criteria for avoiding thermal runaway and predicting steady state conductor temperature in EHVDC cables

P. BORMAN, M. BECHIS
Prysmian

ID: 10315
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Defect Notification - End-of-Warranty - Integrated Assessment – Monitoring - Offshore - Export Cables

Integrated End-of-Warranty Assessment of the Borssele 220 kV Offshore Export Cables

N. ZEBOUCHI[1], M. KAVIAN[1], J. FERNANDEZ PAREDES[1], V. OP DE BEEK[2], S. WEERSTAND[2]
[1]DNV; [2]TenneT

ID: 10319
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Transient measurements, switching overvoltages, underground cable, sheath bonding system, sheath voltage limiter (SVL)

Technology & analysis of transient overvoltage measurements for a 420 kV sectionalized cross-bonded underground cable system in a Siphon circuit of the Dutch EHV transmission grid

K. VELITSIKAKIS[1], M. FARAGALLA[1], A. KUMAR[1], R. ZUIJDERDUIN[1], S. DE CLIPPELAAR[2]
[1]TenneT TSO; [2]DNV

ID: 10322
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Congestion Management, Distribution Network Planning, Dynamic Cable Rating, Medium Voltage Cables, Thermal Ageing, Remaining Lifetime

Unlocking thermal and ampacity headroom of medium-voltage cables: towards a component-aware distribution planning framework

Y. ZHANG[1,2], N. BREKELMANS[2], G. ROUWHORST[1], A. VAN DER MOLEN[2,3], P. NGUYEN[2], P. VAN DER WIELEN[1,2]
[1]DNV; [2]Eindhoven University of Technology; [3]Stedin

ID: 10323
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: tunnel, flooding, XLPE

Recent experience with the consequences of cable tunnel flooding on 132kV XLPE cables and joints

R. BRADLEY
Ausgrid, Australia

ID: 10332
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Challenges resolved in Laying of 220kV Underground Cables and Installation of Termination Towers in the High Altitude Steep Terrains of Zojila Pass

A. CHAKRABORT*, A. AMIN
Powergrid Corporation of India Limited, India

ID: 10355
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Operational, insights, 320 kV, VSC, HVDC, Cable System, Metallic, Pipeline, crossing

Operational insights from the ±320 kV VSC HVDC Cable System: Metallic Pipeline crossing challenges and Thermal Performance Assessment

A. K MATHEW*[1], D. P. TYAGI[1], J. I[2], A. B. BALAKRISHNAN[1]
[1]POWERGRID, India; [2]BPCL , India

ID: 10357
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Design, Challenges, Mitigation, HVDC, Cable, Installation

Design Challenges and Mitigation for HVDC Cable Installation in Metropolitan Cities of India

A. PHADNIS*, V. PATLE, Y. GIRI, P. PAWAR, C. KUNTE, K. JAIN, S. KAREKAR, M. AMBARDEKAR
Adani Electricity , India

ID: 10803
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Trends, High-Reliability, Submarine, Transmission, Zero-Fault

Technological Trends in High-Reliability Zero-Fault Underground and Submarine Transmission Systems in Mexico

P. REALPOZO DEL CASTILLO, R. RAMIREZ RIOS, V. SIERRA MADRIGAL
CIGRE Mexico

ID: 10825
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Cable Termination, Partial Discharge, Monitoring, Online PD Measurement, Machine learning, GBDT, NM

Development of High-Precision Partial Discharge Monitoring System for Cable Termination

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ID: 10992
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Offshore Installation, Submarine Cables, Hang Off

Retention System for Submarine Cable without Armour Wires

K. YOUSEFI
PRYSMIAN ITALY

ID: 11021
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Bentonite, Distributed temperature sensing (DTS), High-voltage cable systems, Thermal conductivity, Underground applications

Non-Invasive Method for Evaluating and Detecting Failures in Bentonite Filling in High-Voltage Cable Ducts during Project Execution

T. BRAGAGNOLLE, K. CALIANI, G. BODO, W. LEE
Prysmian Brazil

ID: 11022
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: 525 kV insulated cable, power substation, innovation, 525 kV insulated cables installed in cable trays, reliability system, pioneering, sustainable solution

Installation of the 1st 525 kV Insulated Cable in Brazil

J. E. V. FASSARELA[1], R. d. C. FRANÇA[1], T. d. S. d. SILVA[1], E. P. MORAES[1], D. O. SILVEIRA[1], G. T. LOPES[2]

[1]TAESA Brazil; [2]PRYSMIAN Brazil

ID: 11023
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: DTS; Temperature Monitoring System; Operation Analysis; Ampacity Validation; Power System Reliability

Experiences with DTS in Brazil and Ampacity Validation Using a Power Cable Ampacity Software

J. FUJIHARA[1], R. LAVANDOSCKI[1], R. OLIVEIRA[1], D. CARDOSO[1], L. SOUZA[1], F. ARAÚJO[1], J. LOPES[2]
[1]ISA ENERGIA BRASIL Brazil; [2]INOVATEC Brazil

ID: 11024
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Insulated high voltage cables, partial discharges and online monitoring

Online Diagnosis of 138kV Insulated Underground Cables by Measuring Partial Discharges by Grounding Cable – Case Study in More than 300 Light SESA Cables

H. P. AMORIM JUNIOR[1], T. B. RODRIGUES[1], D. L. ARGÔLO[1], T. P. VIÚLA[2], F. R. d. SILVA[2]
[1]CEPEL Brazil; [2]LIGHT Brazil

ID: 11025
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Overhead Lines, Underground Lines, Comparative Analysis, Challenges, Brazilian Scenario

Overhead & Insulated Cables Transmission Lines - Brazilian Scenario

C. DAMASCENO[1], D. M. d. ALMEIDA[2]
[1]Consultant Brazil; [2]PRYSMIAN Brazil

ID: 11060
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Low voltage grid, medium voltage grid, hourly distribution, seasonal distribution, Distribution System Operator (DSO)

Analysis of hourly interruption distribution: the case of the Milan's medium and low voltage grid

V. PICCO[1,2], A. MAZZA[1], A. PEGOIANI[2], I. MARINI[2], R. SIRNA[3]
[1]Politecnico di Torino; [2]A2A; [3]Unareti

ID: 11061
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Cable rating, coupled model, dynamic load, sheath current

"Electrical-Thermal Rating of High-Voltage Cables via EMTP Coupled Modelling"

L. GARZELLI
TERNA, Italy

ID: 11062
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Current rating, steady state, thermal rating, unfilled duct

"HV Cables Thermal Rating under Steady-State Conditions in Unfilled Ducts"

L. GUIZZO
TERNA

ID: 11064
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Cable monitoring, Partial Discharges, Transmission line model

Capacitive PD Sensing and Transmission Line Modeling for Long-Range Cable Defect Detection

V. LI VIGNI
PRYSMIAN

ID: 11065
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: HVDC, MIND cables, slow polarity reversal, LCC technology, power flow reversal

Qualification and reliability assessment of slow polarity reversal endurance in HVDC MIND cables for enhanced grid flexibility

M. MARZINOTTO
TERNA

ID: 11066
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: HVDC, Cable monitoring, Partial Discharges, Ageing monitoring, Space Charges

Towards predictive monitoring of HVDC Cables: An integrated system for stress, partial discharges and ageing assessment

G. RIZZO
PRYSMIAN

ID: 11117
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Energy Transition, cable joints, market players

Performance of MV Underground Cable Joints

M. POMPILI
UNIVERSITA DI ROMA La Sapienza

ID: 11265
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Bonding leads impedance, cable systems, high frequency, very fast transients

Calculation and experimental validation of impedance of buried single-core bonding leads

L. COLLA, M. BRAMBILLA, M. BECHIS
Prysmian Italy

ID: 11278
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Improving the efficiency of renewable energy cable networks

C. FERREIRA, P. REBELO, M. DMITRIEV
CABELTE

ID: 11290
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Damped AC Voltage - Export - Inter-array - Cable - Failure Rate - Repair Cost – Offshore - Wind Energy - Partial Discharge - Resonant AC Voltage - Site-acceptance Test - Quality Control

Quality Assurance of Offshore Wind Farm Power Cables

E. GULSKI[1], G. ANDERS[1], J. PARCIAK[2]
[1]Lodz University of Technology, Poland; [2]Onsite HV Solutions Central Europe, Poland

ID: 11308
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Asset management, Cable terminations, Condition assessment, Health Index, Lifecycle, Weighted aggregation, Oil filled, XLPE.

Condition Assessment of Underground Power Cable Terminations

A. SAM MATHEW, S. GNANASAMBANDAM, D. GALLOWAY
National Grid United Kingdom

ID: 11381
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Safety, Faults, Protection, Fire risk, Inspection, Monitoring, High Voltage Cables Maintenance

Safety in Underground High-Voltage Cable: Effective Solutions for People and Infrastructure Protection

R. GÓMEZ RIVERA, R. REINOSO DELGADO, G. DONOSO CONEJO, E. NOGUEROLES LAGUIA, V. BONET DIAZ
Red Eléctrica, Spain

ID: 11382
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Fault events analysis in underground high-voltage cables

R. GÓMEZ RIVERA, R. REINOSO DELGADO, G. DONOSO CONEJO, E. NOGUEROLES LAGUIA

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ID: 11383
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Breakdown, Fault, Location, High Voltage Cables, Maintenance, TDR, Murray Bridge, Glasser Bridge

Lessons learned from fault location in underground high-voltage cables and use cases

R. GÓMEZ RIVERA[1], U. RUIZ DE AZÚA FERNÁNDEZ[2], G. DONOSO CONEJO[1], R. REINOSO DELGADO[1], E. NOGUEROLES LAGUIA[1], D. BLANCO SACEDO[1], V. BONET DIAZ[1]
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ID: 11384
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: High Voltage Cables, Monitoring, Partial Discharges, Predictive Maintenance, Sensors

Sensitivity analysis for the different types of Partial Discharge sensors related to the measured installation

R. GÓMEZ RIVERA[1], J. ORTEGO[3], G. DONOSO CONEJO[1], R. REINOSO DELGADO[1], E. NOGUEROLES LAGUIA[1], V. BONET DIAZ[1], F. GARNACHO[4], A. KHAMLICHI[2]
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ID: 11389
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

How does a HVDC cable system react on TOVs?

M. JEROENSE
MJ MarCable Consulting

ID: 11408
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Water Treeing Behaviour in XLPE Insulation under the Influence of SAP and Development of Evaluation Method

S. KIM, Y. LEE
Hanwha Solutions

ID: 11429
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Study of frequency-dependent properties in HVDC links

C. HENRIKSSON
NKT

ID: 11514
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: HVDC XLPE cables, crosslinking byproduct, extra low frequency, dielectric relaxation

Extra-low Frequency Dielectric Relaxation: Characterization of Crosslinking Byproducts in XLPE HVDC Cable Insulation

J. GAO, X. LU, F. LI, W. LI, Y. LIU, L. ZHONG, X. GONG
Xi'an Jiaotong University

ID: 11515
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: High-voltagecablecircuits, Groundingsystem, Loopresistance, Livedetection

Live Detection Methods and Applications of Loop Resistance in HighVoltage Cable Grounding Systems

J. CAO, X. TAN, C. LI, W. ZHANG, J. CHEN
State Grid Jiangsu Electric Power Co., Ltd. Electric Power Research Institute

ID: 11516
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: SCFF submarine cables, Insulating oil leakage, Underwater fluorescent detector, Leakage point location, Underwater sealing repair device, Leakage point sealing

Research on UV fluorescence-based localization for insulating fluid leakage and underwater sealing repair method for SCFF submarine cable

B. HUI[1], L. FAN[2], L. ZHAO[1], J. LIU[1], Y. ZHAN[1], W. ZHU[1], S. HOU[1]
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ID: 11517
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Offshore wind farm, ±500 kV EHVDC submarine cable, Extra-high voltage, XLPE

Asia's First 2 GW 500 kV EHVDC XLPE Submarine Cable Project: Engineering and Execution

M. AWAIS, Y. ZHAO, F. XIA, J. YANG, G. YU, P. KOSTAS
Ningbo Orient Wires & Cables Co., Ltd.

ID: 11613
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Enhanced Single-Ended Fault Location in Hybrid Transmission Corridors with Underground Cable Sections Using a Dynamic Sequence Impedance Factor

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EDENOR SA

ID: 11670
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Harmonized Long term ageing test, ageing, water tree retardant, MV cables, insulation material

Atasehir GIS TM - Pasakoy TM - Umraniye TM 400 kV, 1x2500 mm² Cu/XLPE/Smooth Al Sheath/HDPE + 4T4FO Construction of XLPE Insulated Underground Power Cable Connection Works

D. ÇELEN[1], L. RONG[2], Y. MERSİN[1]
[1]Demirer Kablo Tesisleri Sanayi ve Ticaret A.Ş; [2]Jiangsu Zhongtian Technology Co., Ltd

ID: 11671
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Underground cable system, 400kV, DTS, RTTR, urban infrastructure

End To End Implementation of a 400kV 1x2500 mm2 XLPE Cable System With DTS Monitoring

E. ELVANOGLU, U. ÇUBUK
Demirer Kablo Tesisleri Sanayi ve Ticaret A.Ş

ID: 11698
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Simplified Versus Realistic Geometries in Thermal Modelling of Cables Installed in HDD

F. RATKOWSKI
NKT

ID: 11709
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Ampacity, Post-Installation Effects, Thermal Resistivity, Trenching Installation, Subsea Cables

State-of-the-art review of post-installation effects on subsea cable thermal properties for rating calculations

F. GARCIA, F. ALBUQUERQUE, L. CROSS, J. REYNA
Ørsted Wind Power

ID: 11712
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Sequence impedance of submarine cables: Part II

A. GAROLERA[1], T. KVARTS[1], Z. HUANG[1], G. CALLENDER[2], K. GODDARD[2], J. PENG[1], C. COJOCARU[1]
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ID: 11728
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Dynamic cable, Armor wire type, Fatigue performance, UFLEX2D

Comparative analysis on mechanical behavior according to Armor-types of dynamic cable: A FEM-based design perspective

K. CHAE, W. NAM, C. KIM
LS Cable & System

ID: 11729
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Study on the Behavior of Power Cable under External Forces in Duct : A Case Study from a HVDC System in South Korea

H.-d. HEO, M.-h. SHIN, K.-j. SUNG, S.-h. SEO
LS Cable & System

ID: 11737
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Cables in air-filled ducts – comparison between IEC60287 and FEM

O. THYRVIN
NKT

ID: 11787
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Strain–life characterization of lead sheath for submarine cables using small-scale and full-scale bending fatigue tests

Y. LIM
CIGRE Korea

ID: 11866
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Ampacity, Convective cooling, Cable rating, Cable trough, Forced ventilation.

Cables in ventilated conduits: experimental and numerical study of heat transfer and cable ratings

S. M. HELLESØ, K. S. THINN, E. EBERG, R. F. MELLERUD
SINTEF Energy Research

ID: 11868
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: KEYWORDS Current Rating Calculations, Empirical Correlation, Finite Element Method, Trough.

Development and Validation of an Improved Cable Thermal Rating Model for Unfilled Trough Installations

W. PORADOWSKI[1], G. J. ANDERS[2], M. ENGEBRETHSEN[1], E. FJELD[3]
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ID: 11869
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Inter Array Cable Rating – Considerations Beyond IEC standards

Inter Array Cable Rating – Considerations Beyond IEC standards

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Unitech Power Systems

ID: 11923
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Commissioning Tests, Offshore Wind Farm, Load Cycle, EHV Export Cable, HVDC Export Cable

Offshore Windfarm Export Cable System Commissioning, is it fit for purpose?

R. SVOMA[1], L. WILLIAMS[1], C. HIGGINS[2], J. THEOBALD[2]
[1]PowerSure Technology Ltd. UK; [2]Ove Arup UK

ID: 12003
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Field Trials of DAS-Based TPID Systems for the Monitoring of Urban Extra High Voltage Cable Systems

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Wiener Netze GmbH

ID: 12005
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Arc Pre-location - APL - Cable Fault Location - Very Low Frequency - Medium Voltage, Long Cables, Synergetic Workflow, Intermittent Faults, Transient Analysis

Arc Pre-Location in Medium Voltage VLF Cable Testing: Performance Assessment on various Cable Insulation Faults, and Workflow Variation depending on used Equipment

J. KRUIJEN, S. DAS MERCES JOAO, L. GAJDOSOVA
b2 electronics GmbH

ID: 12058
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Cable systems, Electromagnetic fields, Fault analysis, Inductive interference, Submarine transmission

Inductive Interference Assessment from 230 kV Submarine and Underground Cable Systems: A Case Study in Southern Thailand

P. TOSRIGAW, A. JIRACHAWALWISOOT, W. APHICHATO, C. CHOOPUM
Electricity Generating Authority of Thailand (EGAT)

ID: 12092
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Topside circulating current and lead sheath grounding of export cables for offshore wind

T. KVARTS[1], X. GIAGKOU[1], J. PILGRIM[2], O. N. CWIKOWSKI[2], A. BINNIAN[2]
[1]Ørsted Wind Power; [2]Ørsted Power

ID: 12115
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

A new model for condition assessment of medium voltage XLPE underground cables using statistical failures and testing insulation reports

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ID: 12234
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Underground Cable, Pipe Type Cable, Gas Compression Cable, Retrofitting, Oil Filled Cable, Cable Removal.

Retrofitting of an External Gas Compression Cable System

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SSEN Transmission UK

ID: 12266
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: depth of cover, cable-seabed interaction, DTS, RTTR

Depth of cover Algorithm Validation in the Baltic Sea using time-lapse geophysical Surveys

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[1]EOSS Switzerland; [2]EOSS Italy; [3]Southampton University UK; [4]Vattenfall Germany; [5]ELECTROSUISSE / CIGRE Switzerland NC Secretary

ID: 12268
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: power cable, fault finding, DAS, fibre sensing

Field Evidence and Lesson Learned from offshore Power Cable Fault finding using distributed acoustic Sensing

E. ROCHAT[1], E. NIGRO[2], M. D' AMBROSIO[1], F. BUCCHERI[3], M. STOECKLI[4]
[1]EOSS Switzerland; [2]Prysmian Italy; [3]EOSS Italy; [4]ELECTROSUISSE / CIGRE Switzerland NC Secretary

ID: 12352
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Sheath Voltage Limiters (SVLs), Specially Bonded Cable Systems, Cross-Bonding / Single-Point Bonding, Induced Sheath Voltage, Overvoltage Protection.

Criteria and Methodologies for Selecting Sheath Voltage Limiters (SVLs)

I. MITIC[1], P. FLETCHER[2], E. SALOMONE[2], S. KNEZEVIC[3], M. STOKIC[1], M. MANDARIC[1]

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ID: 12377
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

New methods for the selection of the bonding cable and SVL

C. FERREIRA, P. REBELO, M. DMITRIEV
CABELTE

ID: 12404
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Acoustic Wave Propagation, Cable Fault Localization, Distributed Acoustic Sensing, Power Cable Monitoring, Real-Time Signal Processing, V-Moveout Detector

Field-Proven V-Moveout Detector for Real-Time Power Cable Fault Detection using Distributed Acoustic Sensing

W. SFAR ZAOUI[1], D. DAMM[1], S. BOHR[1], C. CANTINI[2], A. RIDGE[2], M. STROHBACH[1]
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ID: 12436
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Comparison of an autoencoder and an insulation forest model for the condition assessment of low voltage cables based on powerline communication data

M. K. H. KREISKÖTHER, J. PLENER
amperias GmbH Germany

ID: 12445
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Artificial Intelligence – Cable Threat Detection – Deep Neural Network – Distributed Acoustic Sensing – Distributed Fiber Optic Sensing – Power Cable Monitoring – Third-Party Intrusion – Critical Infrastructure – CRITIS – NIS2

Inbuilt HV Cable Fiber Optics for AI-based Cable Threat Detection in urban Environments - a Case Study

W. SFAR ZAOUI[1], N. AGHANOURIAN[1], B. DRAPP[1], D. MOCKENHAUPT[1], M. STROHBACH[1], S. SYED[1], F. AINHIRN[2]
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ID: 12569
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Sequence Impedance Calculation in Three-Core, Double-Layer Armored Power Cables: Accurate and Efficient Modeling Approaches

K. BITSI, I. CHALEPLIDIS, D. GKITSOS, D. CHATZIPETROS, V. L. KANAS, A. I. CHRYSOCHOS
Hellenic Cables Greece

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B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Current Rating Improvement via CFD Modeling of Underground HVAC Cables in Natural Ventilated Troughs

A. NEGINHAL, D. CHATZIPETROS, C. BOIKOS, P. PARISSIS
Hellenic Cables Greece

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B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Water diffusion modeling in power cables: Addressing 1D to 3D geometries using FEM

A. I. CHRYSOCHOS, L. V. TARANU
Hellenic Cables Greece

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B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine

Accurate modelling of induced voltages on cables with single-point bonded sheaths installed in HV substations

S. PAPADAKIS, D. CHATZIPETROS, I. CHALEPLIDIS, K. KOUTRAS, V. KARAKONSTANTI, M. BETSI, V. L. KANAS, A. I. CHRYSOCHOS
Hellenic Cables Greece

ID: 12613
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Ampacity, Submarine cable, IEC 60287, Finite element analysis, FEA, FEM, Thermal modelling, Open Source

Thermal Modeling and Ampacity of Submarine Three Phase AC Cables with Lead Sheath: IEC 60287 versus Hybrid Analytical-FEA Approach

P. VRACHAMIS[1], B. GIANELLI[2]
[1]DEME Group Netherlands; [2]DEME Group Netherlands

ID: 12634
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Recent experience with AC and DC cables, both land and submarine
Keywords: Cable, Monitoring, Temperature, Diagnostics, Fiber Optic, Sensor, Raman Scattering, Hotspot, Damage, Fault, Reliability

Indirect Fault Location in Cable Lines Using Distributed Temperature Sensing

M. IVANOV
PJSC «Rosseti Lenenergo» Cable Line Service 35-220 kV Russia

B1 PS3 - Environmental impact and cable lifecycle

ID: 10284
B1 INSULATED CABLES - Full Papers
Topics: B1 PS3 - Environmental impact and cable lifecycle
Keywords: Circadian rhythm, electromagnetic fields, European flounder, Platichthys flesus, European plaice Pleuronectes platessa, subsea power cables

Advancing knowledge on electromagnetic field impacts on flatfish combining in- and ex-situ technical and ecological research

G. SWINKELS[1], E. CHAPMAN[2], C. ROCHAS[1], Z. BURNS[2], P. HARSANYI[2], A. HERMANS[3], K. SCOTT[2]
[1]TSO TenneT; [2]St Abbs Marine Station; [3]Wageningen University & TenneT TSO

ID: 10356
B1 INSULATED CABLES - Full Papers
Topics: B1 PS3 - Environmental impact and cable lifecycle
Keywords: Routing, Installing, EHV, AC, XLPE, Land, Cables, Geotechnically, Challenging, Terrain

Routing and Installing EHV AC XLPE Land Cables in Geotechnically Challenging Terrain: Experience from the Himalayas

A. KUMAR *, D. SHUKLA, V. KAPIL
BHEL, India

ID: 10827
B1 INSULATED CABLES - Full Papers
Topics: B1 PS3 - Environmental impact and cable lifecycle
Keywords: Overhead Cable Laying, Shorter Construction Period, Reduction of the Environmental Impact

Application of 77 kV Overhead Insulated Cables

T. ISHIDA, T. ENOMOTO, S. SUZUKI, A. YAMAGUCHI, A. NAKAZAWA
Kansai Transmission and Distribution, Inc Japan

ID: 11147
B1 INSULATED CABLES - Full Papers
Topics: B1 PS3 - Environmental impact and cable lifecycle
Keywords: Cable termination, 420 kV, XLPE cable, dry type technology, GIS, green gases, SF6 reduction, connection system

"Assessment and Qualification of a 420 kV SF6-free and Dry-Type GIS Cable Termination"

P. BOFFI
PRYSMIAN

ID: 11266
B1 INSULATED CABLES - Full Papers
Topics: B1 PS3 - Environmental impact and cable lifecycle
Keywords: GIS, standard interface, HVAC cable termination, alternative gas, pluggable solution, offshore application

A Sustainable Approach to High-Voltage Grid Expansion: A Standardized 145 kV GIS Cable Termination Developed for SF6 Free Application

S. POGLIANI
PRYSMIAN

ID: 11793
B1 INSULATED CABLES - Full Papers

Topics: B1 PS3 - Environmental impact and cable lifecycle
Keywords: Submarine cables, Free span, Scouring, Vortex-induced vibration, Fatigue life

Research on the Development Mechanism of Submarine Cable Suspension and Fatigue Life Assessment under the Action of Ocean Currents

B. FENG[1], M. FU[1], L. JIA[1], L. FAN[2], Y. LI[2], Q. LU[3], J. YAN[1], S. HOU[2]
[1]CSG Electric Power Research Institute Co., Ltd. China; [2]China Southern Power Grid Co., LTD China; [3]Dalian University of Technology China

ID: 11870
B1 INSULATED CABLES - Full Papers
Topics: B1 PS3 - Environmental impact and cable lifecycle
Keywords: LCA, Submarine power cables, Environmental impact, Climate change

Life cycle assessment of submarine power cables for distribution of offshore wind power to land

H. R. BJØRLO[1,2], E. DRØIVOLDSMO[2]
[1]NTNU; [2]Nexans

ID: 12273
B1 INSULATED CABLES - Full Papers
Topics: B1 PS3 - Environmental impact and cable lifecycle
Keywords: process capability, high-volume manufacturing, defect rate, sigma level

Scalable and efficient production Strategies for HVDC Cables and Accessories: Enabling the Next Generation of Energy Infrastructure

R. GUENDUEZ[1], J. KRAUS[1], M. STOECKLI[2]
[1]KRAUS Consulting GmbH Switzerland; [2]ELECTROSUISSE / CIGRE Switzerland NC Secretary

B2 OVERHEAD LINES

B2 PS1 - OHL modernization and emerging technologies

ID: 10110
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: 3D model, BIM, Building Information Modelling, CDE, Common Data Environment, construction, design, digitalization, facility management, Geographic Information System, GIS, information management, Overhead Transmission Line

OTL BIM in Practice: From Design and Construction Towards Future Integration into Operation and Maintenance Processes

M. BECAN[1], N. ZIMA[1], R. FILIPIC[1], D. MARIC[1], A. STARC[2], M. STARASINIC[2]
[1]ELES, d.o.o., Slovenia; [2]IBE, d.d., Slovenia

ID: 10118
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

High tensile steel wire cores for High Temperature Low Sag conductors: A case study for Elia Belgium

H. DEPAMELAERE[1], P. COUNESON[2], M. JAVORSKY[1]
[1]Bekaert, Belgium; [2]Decube Consult, Belgium

ID: 10119
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

Next generation of hinge mounted insulating crossarms

J. MAESSCHALCK, P. SMET
ELIA, Belgium

ID: 10135
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: ACSS - Manufacturing - Batch - Bobbin - Anneal - Sag - Conductivity

An Industry Summary of Batch versus Bobbin Annealed Conductors

L. DEPPA
WSP, United States of America

ID: 10184
B2 OVERHEAD LINES - Full Papers

Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Dynamic Line Rating - Computational Fluid Dynamics - Wind Speed - Meteorology - Conductor

Hyperlocal Forecasting with Sensor Feedback for Reduced Uncertainty in Dynamic Line Rating

I. BARLET, K. ENGEL, J. MARMILLO
LineVision, United States of America

ID: 10285
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Overhead lines, 380 kV, Standardization, Towers

Standard 380kV lattice steel tower within the Netherlands

P. VAN DER HORST, W. DEN HAAS, E. PLATENKAMP
TenneT TSO

ID: 10286
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: LiDAR, Clearance, Conductor Modelling, Overhead Line, Climate Data, Thermal Rating, Finite Element Analysis, PLS-CADD, Capacity Increase

Refined Clearance Assessment of Overhead Lines Combining LiDAR, Climate Data, and PLS-CADD Finite Element Analysis

R. LOMMERS[1], J. FRANCO[1], T. BÖRGER[1], E. PLATENKAMP[2]
[1]DNV; [2]TenneT TSO

ID: 10288
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Overhead lines, external clearance, insulation coordination, lightning performance, European standards

Improved calculations for external clearances on overhead lines

I. TANNEMAAT[1], C. ENGELBRECHT[2]
[1]TenneT TSO; [2]DNV

ID: 10289
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Historical weather data, Seasonal Line Rating, Static Line Rating (SLR), Overhead lines

Development and Application of Hourly Values for the Static Rating of High-Voltage Overhead Lines

L. STOOP[1], I. TANNEMAAT[1], R. SCHELLEVIS[1], B. VAN DUINEN[2], M. DE DOOIJ[1], W. TROMP[1]
[1]TenneT TSO; [2]KNMI

ID: 10324
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: self-alignment, erection, suspended load

Aim-Guide-Lock self-alignment system for tower erection avoids work under suspended load

A. WILLIAMS[1], B. GARWOOD[1], G. OLEWCZYNSKI[2]
[1]Aurecon, Australia; [2]Gateway Energy, Australia

ID: 10361
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Strain, Gauge-Based, Quantitative, Monitoring, During, Prototype, Testing, Transmission, Towers

Strain Gauge-Based Quantitative Monitoring During Prototype Testing of Transmission Towers

P. PAUL*, P. PIRTA
Resonia Limited, India

ID: 10371
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Smart Greener Grid Expansion: Re-engineering 66 kVInfrastructure for 220 kV Operation – BBMB Case Study.

Smart Greener Grid Expansion: Re-engineering 66 kVInfrastructure for 220 kV Operation – BBMB Case Study.

R. SHEOKAND*, M. TRIPATHI
BHAKRA BEAS MANAGEMENT BOARD (BBMB), India

ID: 10372
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: aerial, stringing, solutions

Use of aerial stringing solutions in vegetated & rough terrain of GTTPL Project.

U. JAISWAL*[1], C. KALRA[2], D. SINGH[3], N. B. PITALE[4]
[1]Resonia Ltd , India; [2]Resonia Ltd , India; [3]Serentica Renewables India Pvt. Ltd.; [4]Resonia Ltd , India

ID: 10373
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Advanced, Finite, Element, Simulation, Transmission, Towers

Advanced Finite Element Simulation of Transmission Towers

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Resonia Limited, India

ID: 10672
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: construction acceleration, design standardisation, project scalability, transmission line

Designing for delivery: tower spotting strategies to accelerate transmission line design and construction under South Africa's TDP2024

J. CHETTY, G. PILLAY, L. PUZA
National Transmission Company South Africa (NTCSA)

ID: 10690
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Line Thermal, Critical Spans/Sections

Line Thermal Uprating of Overhead Conductors Using Real Time Rating Technology by Identification of Critical Spans/Sections

D. PAUL, P. CULLEN
Powerlink Queensland, Australia

ID: 10693
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Braced post insulator, combined load curve, combined working load curve, combined ultimate load curve, capacity curve

Composite Braced Post Insulators: Optimal installation angle and a theoretical way forward

A. MUIR, R. MACEY
Mace Technologies

ID: 10703
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: HTLS conductor, Composite core, Non-Destructive Testing (NDT), Asset management, Field experience

Dielectric assessment of composite core conductors: impact and return of experience from a field deployment

L. RICHARD[1], C. DUTRIEZ[1], M. DELBOVE[2], E. PLATENKAMP[3]
[1]Epsilon Cable France; [2]NEXANS; [3]TenneT

ID: 10727
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Audible noise, corona discharge, electric field intensity, IEC 315 conductor, Surge Impedance Loading (SIL)

Addressing audible noise challenges in the integration of the 6 x IEC 315 conductor on South Africa's 765 kV transmission network

R. KHAN, A. BURGER, R. SINGH
National Transmission Company South Africa (NTCSA)

ID: 10737
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Grillage Foundation - Finite Element Method - Beam Elements - Shell Elements - Solid Elements - Soil-Structure Interaction (SSI)

Comparative Analysis of Grillage Foundation Modeling for Lattice Transmission Towers: A Detailed Assessment of Beam Element, Shell Element and Solid Element Approaches Incorporating Soil-Structure Interaction

D. NEZAMOLMOLKI, Z. WEISS
Burns & McDonnell, United States of America

ID: 10828
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Angle steel tower, Dismantling transmission towers, Steel pipe tower, Helicopter, Jig Labour-saving

Development of a Helicopter-assisted Method for Dismantling Steel Pipe Towers

H. INAMI[1], T. HOSHINA[2], S. OKUMURA[3]
[1]Kansai Transmission and Distribution, Inc. Japan; [2]AERO ASAHI CORPORATION Japan; [3]F TECH, Inc. Japan

ID: 10829
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Augmented Reality, Compression Inspection, Sag Measurement, Smartphone

Development of AR-Based Inspection Technology for Transmission Line Construction

F. KONDO[1], R. YUZAWA[1], S. ISHIDA[1], K. YAO[1], T. MASUDA[2], M. OGAWA[2]
[1]Chubu Electric Power Grid Co., Inc. Japan; [2]SENSYN ROBOTICS, Inc. Japan

ID: 10830
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: OHL foundation, Bearing capacity, Overhead line, FE analysis, Centrifuge test, Liquefaction, Countermeasure, Top-shaped concrete block

Modernising OHL Foundation Design: 3D Bearing Capacity Evaluation and Cost-Effective Liquefaction Protection

T. OZAKI, Y. INOUE, Y. TOMINAGA, Y. YASUKOCHI, F. KUHARA, S. HORIMOTO, H. YONEMORI
Kyushu Electric Engineering Consultants Inc. Japan

ID: 10832
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Advanced Conductor, Arc test, Galloping, HTLS, Swinging

Verification for Expanding the Application of Composite Conductor "ACFR"

T. YAMAKI[1], N. SUDO[2], K. FUJII[2], T. SHIRAISHI[3], K. NARA[1], M. SUZUKI[4]
[1]Kitanihon electric cable Japan; [2]Tohoku Electric Power Network Japan; [3]TEPCO Power Grid Japan; [4]Tokyo Rope International Japan

ID: 10871
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Composite materials; CICA Cross-Rope; Structural design; High Surge Impedance Level; Compactation

Structural analysis of the CICA Cross-Rope tower

R. LOPES[1], P. CAMPOS[1], M. RECHTMAN[1], X. WANG[2], C. LIU[2], Q. HUANG[2], L. ROSA[1], Y. LIU[2], M. FERNANDES[1]
[1]Shemar Brazil; [2]Shemar China

ID: 10873
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Helical foundations, foundation reinforcement, overhead lines

Innovative Foundation Reinforcement Solution for Guyed Transmission Line Structures Using Helical Piles

D. BRAGA[1], J. MANOEL[2], R. DOLABELA[2]
[1]Taesa Brazil; [2]Vértice/Vercon Brazil

ID: 10875
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: HVDC Transmission - Silicone Rubber - Polymer Insulators - Composites - Project Optimization

Consideration of Composite Insulator Assemblies for UHV DC Transmisison Line Projects in the USA

J. BUTLER[1], C. MILITARU[2]
[1]Hubbell, Inc., United States of America; [2]WSP, United States of America

ID: 11019
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Geotechnical investigation, Transmission line foundations, Site characterization, Soil-structure interaction, Line routing assessment, Foundation design, Standard Penetration Test (SPT), Geophysical methods

Poorly Executed Surveys: Hidden Risks in Energy Transmission Projects

P. R. MORENO, R. F. MENDES, F. A. ARAI, N. C. FARIA
ISA ENERGIA Brazil

ID: 11067
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: phases, Overhead line, Loadability, Magnetic field induction

Loadability and Magnetic Field Characteristics of Advanced 7-Phase Overhead Conductors

M. BOIANI
TERNA, Italy

ID: 11069
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Overhead lines 5-phases towers, EMF, OHL reconstruction, ampacity increase

The '5 Phases' OHL Towers for Refurbishing Existing Lines: First Installations and Experiences on 150 kV and 230 kV Backbones in Italy

F. PALONE
TERNA

ID: 11070
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Overhead transmisson lines, stringing job site, IoT, jobsite connection, mainpower reduction, effiency

Connection of the overhead stringing job site

A. GALLI
TESMEC

ID: 11152
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: crossings, tower modifications, transmission towers, underpass

Underpass structure options for 400 kV line crossings in South Africa

S. NATESAN, R. KHUMALO, D. SEKHOTO
National Transmission Company South Africa (NTCSA)

ID: 11157
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Climatic loads, deterministic design, probabilistic design, safety loading, security loading, transmission towers

The evolution of design criteria in tower designs in NTCSA

S. NATESAN[1], J. D. SERRANO[2], S. DUBAZANA[2]
[1]National Transmission Company South Africa; [2]Consultant

ID: 11173
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: remote monitoring, transmission line capacity, conductor condition

Study of the Feasibility of Increasing the Capacity of Overhead Transmission Lines using Real-Time Remote Monitoring Data of Conductors

M. PANARIN, V. TOKAREV
ServiceEnergy Ltd

ID: 11313
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

The Investigation and Modelling of Vertically Installed Inter-Phase Spacers for the Enhancement of Clearance in Overhead Transmission Lines

M. NEGARPOUR, F. GHELICHI
Monenco Iran

ID: 11362
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Accelerated thermal aging, Arrhenius aging, Carbon fiber composites, Composite core, Conductors for overhead lines, IEC TS 62818, Polymer matrix, Reinforcements, Resin, Tensile strength

Overhead Conductor with stranded Multiwire Composite Core in Aluminium Sheath – IEC TS 62818 Arrhenius testing of Resins

A. HASSINEN[1], R. BIGIARINI[2], S. PIRINEN[1], D. GABELLI[2]
[1]Exel Composites; [2]Tratos Group

ID: 11439
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

Mechanical testing of a new "node-and-bolt-based" assembly system using a full-scale tubular lattice tower module

J. R. LÓPEZ-BLANCO[1], P. RODRÍGUEZ-HERRERÍAS[2], C. GARCÍA-BARRIOS[2]
[1]Anisopter Insightful Research, S.L., Spain; [2]Red Eléctrica, Spain

ID: 11498
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: RF433; WiFi; Power Consumption; Icing; Sens

Research on a New Transmission Line Icing Online Monitoring System Based on RF433 Technology

Z. WANG, Q. HUANG, X. MENG, J. HU
Guiyang Bureau of China Southern Power Grid Ultra High Voltage Transmission Company

ID: 11615
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Direct Ambient Adjusted Ratings - Embedded Distributed Sensing - Transmission Capacity Optimization - Predictive Maintenance - Wildfire Risk Mitigation

Monitoring of Overhead Lines Using Embedded Optical Fibers for Capacity Optimization, Line Awareness, and Determining Maintenance Schedules

D. GOEKJIAN, C. WONG
CTC Global, United States of America

ID: 11620
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: DLR, Ampacity, Conductor Temperature, Asset Resiliency, Spectrally Selective Coatings

Static Line Uprating: In-situ Modification of Overhead Conductor Properties for Continuous Capacity Enhancements and Synergy with Dynamic Line Ratings

O. HIGBEE, E. KHONG, N. COOGAN
AssetCool United Kingdom

ID: 11629
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

Maintaining The Power Network Integrity Through Dynamic Line Rating Technologies

H. ALMAKRAMI
Saudi Electricity Company

ID: 11762
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Artificial Intelligence, Transmission Tower Design, AI Augmented Design, Generative Design, Ground Structure Method, Machine Learning Surrogates, Reinforcement Learning, Multi-Agent System, Structural Optimization, Institutional Knowledge Retention, CAPEX

Artificial Intelligence Augmented Design for Electrical Transmission Line Towers

J. TOTH
RecognAIse Technologies Inc., Canada

ID: 11788
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

A Study on New Compact Modular New Tensioning Equipment for Overhead Transmission Lines

S.-d. ROH, B.-K. KIM, J.-C. KIM
KEPCO(Korea Electric Power Corporation)

ID: 11901
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

Autonomous UAV-Based Thermal Inspection and AI-Powered Fault Detection for Overhead Power Lines

A. IBRAHIM, S. ABDELAL, B. ABABNEH, D. ALEIDEH
Irbid district Electricity Company (IDECO)

ID: 11904
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Earthing switches, Electromagnetic coupling, Electrostatic coupling, Frequency domain, High-speed switching, Induced Currents.

EHV AC Earth Switch Induced Current Capability Using Frequency Domain Approach

H. NEGI, M. I. KHAN, I. A. JATOI, T. EATON
Arcadis United Kingdom

ID: 12037
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

Leveraging Artificial Intelligence and Genetic Algorithms for Enhanced Techno-Economic Conductor Selection in Power Transmission Systems

C. MARTINEZ[1], V. JIMENEZ[2], J. PULGARIN RIVERA[3]
[1]ISES; [2]ISES; [3]Universidad Distrital Francisco Jose de Caldas

ID: 12042
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

Predictive Analytics for Vegetation Management within Power Derived from Data Collected during Pruning Activities: A Strategy Approach to Enhancing Sustainability and Operational Efficiency in the Energy Sector

L. H. BERRIO[1], D. L. ARANGO CAÑAS[2], R. LUNA URIBE[3]
[1]EPM; [2]EPM; [3]EPM

ID: 12044
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

HVDC–HVAC Hybrid Lines: A Feasible Solution for Transmission Expansion in Colombia

V. JIMENEZ[1], C. MARTINEZ[2], D. TAUTA[3], J. OSORIO[4], A. PEDRAZA[5], H. RESTREPO[6], J. PULGARIN[7]
[1]ISES; [2]ISES; [3]EPM; [4]EPM; [5]ISA; [6]ISA; [7]Universidad distrital

ID: 12045
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

Evaluation of HVDC transmission lines electrical insulation performance under environmental conditions in Colombia

D. TAUTA[1], A. PEDRAZA[2], H. RESTREPO[3]
[1]EPM; [2]ISA; [3]ISA

ID: 12052
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

Development of Insulation Gurad to Prevent Flashover Caused by Jumper Wire Swing

S.-h. KWON
KEPCO

ID: 12157
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

Solution to OPGW Cable Breakage Due to Lightning Strikes in Transmission Lines: Technical and Economic Evaluation of Alternatives

J. C. MEJIA[1], Á. MAZO[2], B. OSORIO[3], M. ESCOBAR[4], Y. D. PEREZ[5], S. ESTEVEZ[6], A. PEDRAZA[7]
[1]Intercolombia; [2]intercolombia; [3]ISA; [4]Intercolombia; [5]Intercolombia; [6]ISA; [7]ISA

ID: 12203
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

Load Transfer and Weight Analysis of Angular and Tubular Profile Towers in Transmission Lines for Large-Span Crossings

J. S. VARGAS[1], A. GOMEZ[2], J. M. VARILLA[3], S. CASTILLO[4]
[1]HVM; [2]HVM; [3]HVM; [4]HVM

ID: 12229
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Transmission line design, Artificial Intelligence, AI, AI-Augmented Design (AAD), Generative Grid

Artificial Intelligence Augmented Transmission Line Design

J. TOTH[1], L. RACZ[2], B. NEMETH[2]
[1]RecognAIse Technologies Inc.; [2]Budapest University of Technology and Economics

ID: 12232
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Kosovo, Distribution Network, Overhead Line, Technology, Modernization

Modernization of Overhead Lines in Kosovo: Challenges, Technologies and Future Directions

T. KOCABAYRAKTAR, D. GASHI, A. ALIDEMAJ
Kosovo Electricity Distribution Company

ID: 12338
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

Uprating of 400 kV overhead lines using conductor temperature sensors and ambient weather stations

R. PUFFER[1], G. MOLINAR[2], C. KANDLBINDER-PARET[2]
[1]RWTH Aachen University; [2]TenneT TSO GmbH

ID: 12426
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

FlexiBL A new temporary tower solution for use in the 110-kV grid of Deutsche Bahn

J. RÖHM[1], J. MOSCHALL[2]
[1]Omexom Hochspannung GmbH; [2]DB Energie GmbH

ID: 12444
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies

A new catenary system for safe and efficient crossing protection

M. ERSPAMER[1], C. WINTER[2], H. KETTERER[3], A. PFLAUM[4]
[1]Omexom Hochspannung GmbH Germany; [2]Tennet TSO GmbH Germany; [3]Sepa-Tech GmbH Germany; [4]Seilflechter Tauwerk GmbH Germany

ID: 12490
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Dynamic Line Rating (DLR), Numerical Weather Prediction (NWP), Neural Networks (NN), Thermal rating, EMS/SCADA integration, congestion management, Real-time and planning horizons (IDCF, DACF, D2CF and WAPP)

Enhancing Grid Performance: Implementing Dynamic Line Rating on Transmission Systems

T. BUTSCHEN[1], B. RUSEK[1], M. RASCHKOWSKI[1], R. SCHADEN[1], F. BERSTER[1], B. KIRBUS[2], A. WESSEL[2], M. POSAUTZ[2]
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ID: 12503
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Lightning; monitoring; localization; distribution network

Application of Lightning Monitoring System in Beijing Distribution Network

P. ZHANG, L. ZHAO, C. LI, K. ZHOU, W. QI, R. ZHANG, X. LAI
State Grid Beijing Electric Power Research Institute

ID: 12611
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Field test, Multi-function conductors, Snow accretion, Wind pressure

Characteristics and Application of Multi-Function Conductors

S. TAKAHASHI[1], N. TAKADA[2], T. SHIRAISHI[3], N. SUGA[4], T. TAKAHASHI[5], T. ENAKA[6]
[1]TEPCO Power Grid, Inc. Japan; [2]TEPCO Power Grid, Inc. Japan; [3]TEPCO Power Grid, Inc. Japan; [4]Sumitomo Electric Industries,Ltd Japan; [5]Sumitomo Electric Industries,Ltd Japan; [6]Sumitomo Electric Industries,Ltd Japan

ID: 12619
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - OHL modernization and emerging technologies
Keywords: Insulated Cross-arm (ICA), Horizontal Vee insulator (HV Insulator), Axis of Rotation (AoR), Steel Pole, Span geometry

Feasibility of Horizontal-Vee Insulator Configurations for Application in Undulating Terrain

O. O. IGENEWARI
Energyline Ltd England

B2 PS2 - Health assessment and refurbishment of OHL

ID: 10120
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL

Use of Fiber Reinforced Polymer (FRP) membranes for reinforcement and structural restoration of 70kV concrete poles

E. DE BOE[1], T. ZARGAR[2], R. K. DOWELL[3]
[1]ELIA, Belgium; [2]GridWrap, United States of America; [3]San Diego State University, United States of America

ID: 10136
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Artificial Intelligence - Asset Management - Point Clouds - Semantic Segmentation - Vegetation Management

AI-Powered 3D Data Fusion System for Vegetation Risk Assessment in Distribution Networks

B. HUANG, J. ZHAO, A. FAZLAGIC, S. REDDING
Eversource Energy, United States of America

ID: 10229
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Carbon Fiber Composite Core (CFC) - Arrhenius Thermal Testing - IEC TS62818-1 - ASTM B987 - Arrhenius Equation

Evaluation, Analysis, and Recommendation of Acceptance Criteria to Determine Ageing on Composite Core Conductors Utilizing the Arrhenius Method

E. BOSZE, C. WONG
CTC Global, United States of America

ID: 10290
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Distributed Acoustic Sensing (DAS), Dynamic Line Rating (DLR), Optic Ground Wire (OPGW), Overhead Line Monitoring

Monitoring of overhead lines using the optical fiber in OPGW

I. TANNEMAAT[1], B. GODARD[2], X. PAQUEZ[2], F. ZAIDI[3], R. GHENO[1], M. BUISMAN[1]
[1]TenneT TSO; [2]Ampacimon; [3]AP Sensing

ID: 10376
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Ground-Based, Mechanized, Stringing, High-Voltage, Transmission

Innovative Mechanized Stringing Method for Manual Sections in Transmission Lines Reducing Manpower, Enhancing Safety, and Improving Efficiency

P. K. RAI*, A. ABHISHEK, R. GUPTA
POWERGRID, India

ID: 10379
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Risk, Mitigation, Condition, Assessment, Tower, Footing, Corrosion, High, Voltage, Transmission Lines

Risk Mitigation and Condition Assessment of Tower Footing Corrosion in High Voltage Transmission Lines

N. SRIVASTAVA*, G. AGRAWAL, D. PAUL
POWERGRID, India

ID: 10381
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Innovative, Non-Invasive, Method, Insulator, Detection, Transmission Lines

Innovative Non-Invasive Method for Faulty Insulator Detection on Live Transmission Lines

M. RAVINARAYAN*, S. M R, K. PANDEY
TAURUS POWERTRONICS PRIVATE LIMITED , India

ID: 10382
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Proactive, Overhead, Line, Management, Monitoring, Predictive Maintenance, Digital Twins

Enabling Proactive Overhead Line Management Through Monitoring, Predictive Maintenance, and Digital Twins

A. D. DARODE*
POWERGRID, India

ID: 10383
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Strategic, Enhancing, Transmission, Line, Performance, Grid, Reliability

Reliability-Centred Maintenance in POWERGRID: A Strategic Approach for Enhancing Transmission Line Performance and Grid Reliability

D. PAUL*, J. G. JOSE, D. N. JHA, M. K. KALORIA, K. SAHU, N. SRIVASTAVA
POWERGRID, India

ID: 10704
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Aged foundations, concrete deterioration, aggressive environments, concrete core sampling survey, foundation reinforcement solutions, foundation casualty rates.

Range of studies – asset management for aged foundations

B. GIUDICELLI, D. PEREIRA, J. DUCROS
RTE France

ID: 10708
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Artificial Intelligence, Computer Vision, Machine Learning, Network Inspection, Convolutional Neural Networks (CNNs), Data acquisition, European tender, GDPRel

Optimizing surveillance activities with AI solutions

M. TALEB, S. GUDMUNDSSON, M. GUECEM, G. JARDON, E. LAMBIN, J. BOVERO, A. MARGELY, F. BOULESTEIX, P. BERNON
RTE France

ID: 10711
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Overhead conductors, fatigue damage, experimental data, reliability function

Estimating reliability functions of overhead conductors based on experimental fatigue data

J. SAID[1], D. COLLOT[2], V. LAURENT[2]
[1]RTE France; [2]Mews Labs

ID: 10809
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Artificial Intelligence - Distribution Inspection - Health Assessment - Video Detection

Leveraging AI, Video, and GPS for Distribution Inspections

Z. TANG, J. ZHAO, A. FAZLAGIC, N. HAGHNAZARIAN
Eversource Energy, United States of America

ID: 10831
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: AI, Drone, Visual Inspection

Developing Drone-Based AI for Defect Detection in Transmission Tower Bolts-and-Nuts

S. TERUI[1], M. KATO[1], K. FUJII[1], T. OOTAKI[2], K. YAMAGUCHI[3]
[1]Tohoku Electric Power Network Co., Inc. Japan; [2]KDDI Smart Drone Inc. Japan; [3]KDDI Technology Inc. Japan

ID: 11017
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Digital Twin, Transmission Towers, BIM, Lean Construction, Field Data Integration, Construction Logistics, Asset Lifecycle Management

Digital Twin Implementation for Data-Driven Planning and Assembly of 525 kV Transmission Towers in Brazil

D. BRAGA[1], P. LIBERATO[2], P. ROCHA[2], R. PERUCCI[2], T. CORRADI[2]
[1]Taesa Brazil; [2]Engetower Brazil

ID: 11020
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Preformed splices, overhead conductors, failure analysis, transmission lines, wear, rupture

Evaluation of Failures Due to Slippage of Preformed Splices

D. BRAGA[1], J. ALEXANDER[2]
[1]Taesa Brazil; [2]University UnB Brazil

ID: 11071
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Composite core conductors, Monitoring, HTLS, Distributed sensing, Maintenance of line, Optical fiber sensor, Real-time detection, Thermal aging, Vibrations.

Monitoring of Advanced Composite Core HTLS Conductors with distributed sensing

D. PERONI
DE ANGELI PRODOTTI

ID: 11096
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL

Automating electrical grid asset inspections: improving insulators health assessment with Region-Level annotations

P. D. ROCHA[1], A. COELHO[2], R. SANTOS[2], R. MARTINS[2], L. SILVA CRUZ[1], F. LOPES[3]
[1]UNIVERSIDADE DE COIMBRA; [2]LABELEC; [3]INSTITUTO POLITÉCNICO DE COIMBRA

ID: 11214
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Overhead Line - Line Rating - Clearance - Renewable Energy - Asset Management - Ageing - Probabilistic Assessment

DLR-Based Reassessment of Continuous Current-Carrying Capacity for Improved RES Integration in Legacy HV Networks

A. BABS, T. SAMOTYJAK
Institute of Power Engineering Poland

ID: 11371
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL

Service experience with composite insulators in Danish OHL

P. SIDENVALL
I2G

ID: 11440
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL

Condition Monitoring of Composite Insulators: A Machine Learning Based Investigation at EDF's Martigues Test Station

H. DE SANTOS[1], E. MOAL[2], C. PONS[3]
[1]SHEMAR, Spain; [2]SHEMAR, France; [3]EDF, France

ID: 11552
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL

Corrective maintenance of OHL equipped by composite insulators

I. GUTMAN
I2G

ID: 11566
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Transmission tower; Mechanical characteristics; Wind loads; Fluctuating wind; Failure behavior

Research on Wind-Induced Vibration Response and Failure Behavior of Transmission Towers under Pulsating Wind Action

H. LIU[1], M. LEI[1], L. GONG[2,3], Y. XING[1]
[1]Hebei University of Technology; [2]State Grid Tianjin Electric Power Company; [3]Chengdong Power Supply Company

ID: 11583
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Strain clamps; damage identification; acoustic emission; parametric analysis; BP neural network

Experimental Study and Signal Analysis of Acoustic Emission from Typical Damages of Strain Clamps for Transmission Lines

G. ZHANG, D. LI, B. LIU, J. WANG
State Grid Electric Power Engineering Research Institute

ID: 11586
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Composite insulator, decay-like fracture, degradation, unmanned aerial vehicle, infrared thermography

On-Site Infrared Detection Methodology for Abnormal Temperature Rise in Composite Insulators of High-Voltage Transmission Lines

T. LI[1], Z. ZUO[2], X. LIANG[2], R. TAO[1], C. WU[2], S. LIU[2], R. ZHANG[3], S. WANG[1]
[1]State Grid Zhejiang Electric Power Co Electric Power Research Institute; [2]Tsinghua University; [3]China Electric Power Research Institute

ID: 11628
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: OHL Lightning, Fault Protection

Footing Resistance Design for Reliable OHL Lightning and Fault Protection

S. ALMUBARAK, G. FOTIOU
Saudi Aramco

ID: 11673
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Induced voltage, transmission line interference, overhead transmission line, pipeline

Investigation of Inductive Electromagnetic Effect of 400 kV OHL on 3 Buried Oil Pipelines: Nurdag-Gaziantep Region, Türkiye

Ö. ÇETİN
Turkish Electricity Transmission Corporation

ID: 11872
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Health Assessment, Refurbishment, Maintenance, Aeolian Vibration, Damping, Conductor Motion, Crossing, Fjord, Monitoring, Wind, Enhancing Lifespan.

Vibration monitoring of all phases on Hjørundfjorden fjord crossing – measured differences between phases

B. ADUM[1], P. F. DUARTE DE OLIVEIRA[2], E. MATENE[2], J.-P. PARADIS[2]
[1]Statnett SF; [2]PLP

ID: 12030
B2 OVERHEAD LINES - Full Papers

Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Insulator, Health Index, Aging, Acoustic Analysis

Aging and Reliability of Porcelain Longrod Insulators: Insights from Statistical Modeling and Acoustic Analysis

F. LEHRETZ[2], A. ZEITLER[3], S. REICH[6], C. PURUCKER[1], T. RODLER[5], U. STRACKE[4]
[1]Lapp Insulators GmbH; [2]TenneT TSO GmbH; [3]TenneT TSO GmbH; [4]TenneT TSO GmbH; [5]TenneT TSO GmbH; [6]Grindo- Sonic BV

ID: 12075
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Insulator Flashover, Leakage Current, Insulator Washing, Condition-based Maintenance

Field Monitoring of Leakage Currents in Overhead Transmission Lines for Condition-Based Insulator Maintenance

R. VILLALOBOS, E. RICHARD, C. MAURY
Universidad de La Frontera

ID: 12118
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL

Health Index Model for 230 kV Transmission Line Insulation and Its Evaluation Using Satellite Sensor and Antenna Data (2015-2023)

F. ROJAS[1], G. GUERRA[2]
[1]ENLAZA; [2]ENLAZA

ID: 12125
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL

Performance Analysis of 500 kV Transmission Lines Under Lightning Strokes Considering the Influence of Various Environmental Conditions and the Effect of Terrain Slopes in Colombia

H. RESTREPO[1], A. PEDRAZA[2], A. CAMELO[3], Y. PEREZ[4], J. GOMEZ[5], D. ARANGUREN[6], E. PEREZ[7]
[1]ISA; [2]ISA; [3]ISA; [4]Intercolombia; [5]ISA; [6]KERAUNOS; [7]UNAL

ID: 12186
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL

Circular Economy Applied to Power Grid Rerouting Projects: Maximizing Financial and Environmental Value at ISA INTERCOLOMBIA

A. BEDOYA[1], N. RESTREPO[2]
[1]Intercolombia; [2]intercolombia

ID: 12276
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: composite, insulator, condition, evaluation, lifetime, maintenance

Modern Approach to Condition Evaluation of Composite Insulator in Service

J. STRUMBELJ[1], K. VARLI[2], M. STOECKLI[3]
[1]PFISTERER Switzerland; [2]Amprion Germany; [3]ELECTROSUISSE / CIGRE Switzerland NC Secretary

ID: 12312
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Automated, Fault, Analysis, Asset, Information

In-House Developed Automated Fault Analysis with Multi-Collaboration of Asset Information System

Y. W. CHUNG
Tenaga Nasional Berhad, TNB

ID: 12324
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL

Improved Technical Requirements for Potential Refurbishment on Tower Earthing Systems for Inundated-prone Areas

N. HUDI[1], N. HATTA[2], N. YAAKOB[3]
[1]Tenaga Nasional Berhad, TNB; [2]TNB Research Sdn. Bhd; [3]University Teknologi MARA Malaysia

ID: 12348
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Health assessment and refurbishment of OHL
Keywords: Load transposition - Composite long rod insulators – Damage limit load - Dynamic tensile loading – Drop-weight impact testing

New Experiences with Load Transposition Tests on Composite Long Rod Insulators in Multiple Insulator Sets

J. SEIFERT[1], M. BORNOWSKI[4], C. BÄR[2], U. SCHÄFER[5], U. KREIG[6], M. DOERR[7], K VARLI[8], M. MEISSNER[9], H. WEKENBORG[10], F. LEHRETZ[7], F. BECKER[3], O. HERZ[9], F. SEFFRIN[10], F. SCHMUCK[11], B. ROBBEN[12], H. KRISPIN[13], A. STOCKHAUSEN[14]

[1]TKE GmbH; [2]Wacker Chemie AG; [3]Amprion GmbH; [4]TransNet BW GmbH; [5]E.DIS Netz GmbH; [6]SSB AG Switzerland; [7]TenneT TSO GmbH; [8]Amprion GmbH; [9]Westnetz GmbH; [10]SPIE SAG GmbH; [11]Schmuck HV Insulating Consulting GmbH Switzerland; [12]Siemens Energy Global GmbH & Co. KG; [13]RIBE Elektroarmaturen GmbH; [14]PFISTERER Insulators Wunsiedel GmbH

ID: 12368

B2 OVERHEAD LINES - Full Papers

Topics: B2 PS2 - Health assessment and refurbishment of OHL

Keywords: In-Cloud Icing, climate wind tunnel, collision efficiency, conductor temperature, conductor inclination

Effects of Conductor Temperature and Conductor Angle on Icing of Overhead Power Line Conductors During Atmospheric Icing Events

E. ULLOA JIMENEZ, S. STEEVENS, S. PETERS

Amprion GmbH

ID: 12370

B2 OVERHEAD LINES - Full Papers

Topics: B2 PS2 - Health assessment and refurbishment of OHL

Keywords: Earthing, Grounding, Touch voltage, Tower footing resistance, Soil resistivity, Quantified Risk Assessment, Asset management, Transmission line tower, Electricity pylon, Regression analysis

Systematic Comprehensive Diagnostics of Transmission Line Tower Earthing in Czech Republic

M. KNENICKY[1], M. SVANCAR[1], J. BREJCHA[2], P. SPURNY[2]

[1]EGU – HV Laboratory a.s.; [2]CEPS, a.s.

ID: 12477

B2 OVERHEAD LINES - Full Papers

Topics: B2 PS2 - Health assessment and refurbishment of OHL

Keywords: AC Voltage, Dielectric Behaviour, Insulator, Pollution

Comparison of the dielectric performance of polluted composite insulators under AC and DC stress using the rapid flash over method

F. GEBHARDT[1], S. KÜHNEL[2], S. KORNHUBER[2], P. WERLE[3]

[1]50 Hertz Transmission GmbH Germany; [2]Zittau/Görlitz University of Applied Sciences Germany; [3]Leibniz University Hannover Germany

ID: 12504

B2 OVERHEAD LINES - Full Papers

Topics: B2 PS2 - Health assessment and refurbishment of OHL

Keywords: OHL, Maintenance, Satellite, UAV, Camera, Image

Satellite-based Transmission Line Operation and Maintenance Mothed: A Novel Practice in China

G. QIU, X. TAN, J. CHEN, N. ZHANG

Electric Power Research Institute of State Grid Jiangsu Electric Power Co.,Ltd.

ID: 12505

B2 OVERHEAD LINES - Full Papers

Topics: B2 PS2 - Health assessment and refurbishment of OHL

Keywords: Transmission line; LiDAR point cloud; PointNet++; Point cloud classification; 3D modeling; Intelligent inspection

Research on 3D Point Cloud Modeling and Evaluation Technology for Transmission Lines and Corridor Environments

X. LAI, W. QI, R. ZHANG, K. ZHOU, L. ZHAO, P. ZHANG

State Grid Beijing Electric Power Research Institute

ID: 12558

B2 OVERHEAD LINES - Full Papers

Topics: B2 PS2 - Health assessment and refurbishment of OHL

Non-destructive condition assessment of utility wood pole assets, with severity of decay measurement capability, a more reliable enabler for life extension and refurbishment optimisation

B. MCGOWAN

Scientias Energy

ID: 12606

B2 OVERHEAD LINES - Full Papers

Topics: B2 PS2 - Health assessment and refurbishment of OHL

Keywords: Reinforced Concrete, Foundations, Non-Destructive Testing, Ultrasonic Pulse Velocity, Rebound Hammer, Ground-Penetrating Radar, Half-Cell Potential, SONREB

Non-Destructive Testing Techniques for Condition Assessment of Reinforced Concrete Overhead Transmission Foundations

T. T LUDERE
NTCSA - National Transmission South Africa

B2 PS3 - Sustainability and climate change impacts (with C3)

D: 10291
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Downburst, Overhead lines, Climate change, European standards, Design loads, Climate resilience

Study on impact downburst events on Overhead Lines (OHLs) in the Netherlands in relation to climate change

E. PLATENKAMP[1], G. LENDERINK[2], L. STOOP[1], T. BÖRGER[3]
[1]TenneT TSO; [2]KNMI; [3]DNV

ID: 10292
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)

Study Impact Downburst Events on Overhead Lines (OHLs) in the Netherlands in Relation to Climate Change

E. PLATENKAMP[1], L. STOOP[1], G. LENDERINK[2], T. BÖRGER[3]
[1]TenneT TSO; [2]KNMI; [3]DNV

ID: 10346
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Environmental, Metallurgical

Environmental life cycle analysis of overhead transmission lines: Metallurgical considerations and sustainability impacts

M. LEE
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ID: 10405
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Climate, Change, Extreme, Weather, Events, EHV, Transmission Lines

Impact and Strategies in Response to Climate Change and Extreme Weather Events on EHV Transmission Lines

H. S. BEDI*, M. J. JADWANI, A. D. DUBEY, S. K. SINGH
Power Grid Corporation of India Limited, INDIA

ID: 10406
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Poles, Planet, Life Cycle, Carbon, Footprint, OHL

From Poles to Planet: Life Cycle and Carbon Footprint of OHL Infrastructure with Environmental and Social Compliance

H. S. BEDI*, M. JADWANI, A. DUBEY, S. K. SINGH
Power Grid Corporation of India Limited , INDIA

ID: 10412
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Overhead, Infrastructure, Transmission, Sustainable

Sustainable Transmission Expansion in India: Innovative Approaches to Environmental and Social Compliance in Overhead Infrastructure Development

P. PANDEY, K. KISHOR, P. SALUJA, P. RAMPRASAD*, V. KARRI
POWERGRID CORPORATION OF INDIA LTD

ID: 10413
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Towers, River, Spatial

Spatial Model for Prediction of the Vulnerable Towers Affected by River Meandering

P. S. CHAUHAN*, P. SEERVI, A. SHANKAR
Power Grid Corporation of India Ltd. INDIA

ID: 10773
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Corrosion, extreme weather, full scale testing, guyed V-suspension, guy wire

Extreme weather incident experienced on 765 kV line in South Africa

B. JACOBS, F. MOKHONOANA
National Transmission Company South Africa (NTCSA)

ID: 10833
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Preventive measure, Transmission line insulator, Volcanic ash

Preventive measures and post-event responses for volcanic ash deposition on transmission line insulators

Y. AOKI[1], N. TAKADA[1], T. OSONO[1], T. SHIRAISHI[1], H. HOMMA[2], M. MIYOSHI[2], N. KITA[2]
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ID: 10872
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: climate change, extreme events, power transmission, infrastructure resilience, lightning, wildfires, Brazil

Climate Challenges in Power Transmission: A case study of the 500 kV Line in Brazil

L. L. N. MARTINS[1], J. B. G. F. DA SILVA[1], C. CHEN[2]
[1]Paranaíba Brazil; [2]State Grid Brazil

ID: 10929
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: .Avian Electrocution - Electrocution - Potential Ignition Source - Risk Assessment

Quantifying the Probability of Avian Electrocution on Overhead Transmission and Distribution Structures

G. BHATTACHARJEE, E. JAMPOLE
Exponent, Inc., United States of America

ID: 11363
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Composite core conductors, Sustainability, Carbon fiber (CF), Recycling, Lifecycle management, Energy transition, Advanced conductors, End-of-life (EOL) processes

Sustainable End-of-life for Advanced Composite Core Conductors

A. HASSINEN[1], G. DORIGATTI[2], H. KLOSTER[1]
[1]Exel Composites; [2]De Angeli Prodotti S.r.l.

ID: 11588
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Galloping, UHV, Transmission Lines, Aerodynamic Coefficients, Inter-phase Spacers, Verification, Suppression Effectiveness, 4-DOF

Galloping Mechanism and Anti-Galloping Design of UHV Transmission Lines in Extreme Meteorological Environments

L. WANG, B. CAO, L. WANG
Tsinghua Shenzhen International Graduate School

ID: 11590
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Power Grid Engineering; Geological Hazards; Risk Assessment; Random Forest Model

Research on Susceptibility Risk Assessment and Application of Geological Hazards in Power Grid

Z. ZHANG, B. GONG, L. FAN, D. ZHU, H. LI, H. ZHONG
China Southern Power Grid Co.,Ltd.

ID: 11630
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: RTV silicone rubber, high-voltage overhead transmission lines (OHTL), hydrophobicity transfer mechanism (HTM), hydrophobicity loss and recovery, natural ageing, critical leakage current, flashover voltage, operating life of coating, tangent delta (Tan δ)

Naturally Aged RTV Sir Coatings in Harsh Desert Environment: Technical Approach & Estimation Procedure

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ID: 11754
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Brillouin Optical Time, Domain Reflectometry, Distributed Fibre Optic Sensing, Overhead Lines, Temperature

A Novel Approach to Ice Detection on Power Lines Using Distributed Strain and Temperature Sensing (DSTS) with Field Test Validation

H. OĞUZ[1], V. TÜRKER[1], T. KARTALOĞLU[1], E. ÖZBAY[1], Ü. ÇETİNKAYA[2], M. UZAR[2]
[1]Bilkent University; [2]Turkish Electricity Transmission Corporation

ID: 11757
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: .Overhead Lines, Climate change, Heatwaves, Windstorms, Resilience.

Failure modelling of overhead lines exposed to worsening gradual and instantaneous weather hazards due to climate change

G. EDWARDS[1], O. HLUSTIK[1], M. GALEELA[1], G. MCFADZEAN[1], G. WILSON[1], A. ALI[2], D. ARMIT[2]
[1]TNEI Services UK; [2]National Grid

ID: 11810
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Climate resilience, overhead lines, heat, thermal annealing, climate model, visualisation

Climate Data for Overhead Line Resilience to extreme Events

C. DENT[1], J. MOLLARD[1], G. HEGERL[1], G. WILSON[2], G. EDWARDS[3], C. TURLE[4], A. BHATTACHARYA[1]
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ID: 11873
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Icing, Design loads, Load cases, Icing sensors, Real-time monitoring, Galloping, Weather modelling, Climatology

A novel approach to the assessment of extreme weather events related to icing

B. E. NYGAARD[1], K. INGVALDSEN[1], B. ADUM[2], P. A. HAGEN[2]
[1]Norconsult; [2]Statnett

ID: 11903
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Duck-under scenarios, Electric field, Electromagnetic field, Environmental impact, Exposure Limit Values, Ground-level exposure, Line voltage, Magnetic field, Maxwell theory

Electromagnetic Field Compliance Study for New Overhead Line Design

H. NEGI[1], K. MANGLAM[1], N. SILVA[1], C. THOMPSON[2]
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ID: 12009
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Alpine Region, Climate Change, Climate Projections, Ice Load, Icing Events

Investigation of the future Development of Icing Events in relation to Climate Change in the Alpine Region of Austria

K. WEINDL[1], O. OBERZAUCHER[1], P. MÜLLER[2], M. NUTZ[2]
[1]Austrian Power Grid AG; [2]GeoSphere Austria

ID: 12124
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)

Implementation of Digital Tools for the Application of the Technical-Environmental Methodology for Sustainability in Transmission Line Projects

H. RESTREPO[1], A. OVIEDO[2], M. CARDENAS[3], F. DUARTE[4], J. GOMEZ[5]
[1]ISA; [2]ISA; [3]Intercolombia; [4]Idependiente; [5]ISA

ID: 12230
B2 OVERHEAD LINES - Full Papers

Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Power Line, Ampacity, Climate Change, ACSR, Conductor

Climate-Driven Ampacity Analysis of High-Voltage Power Lines

L. RACZ, D. SZABO, G. FOLDI, G. GOCSEI, B. NEMETH
Budapest University of Technology and Economics

ID: 12246
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: life cycle assessment, product carbon footprint, power grid, climate impact mitigation

Live cycle assessment of 110 kV power lines equipment

D. BUGMANN[1], C. LINDNER[1], A. SPOERRI[2], L. SUBAL[2], M. STOECKLI[3]
[1]Axpo Grid AG Switzerland; [2]EBP AG Switzerland; [3]ELECTROSUISSE / CIGRE Switzerland NC Secretary

ID: 12327
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)

Experience in Assessing HTLS Carbon Composite Core Conductor on Field Trial While Adhering to Sustainability and Strategies to Response Climate Change Issues in Malaysia

M. I. SHAMSUDIN, M. J. ABD JAWAS
Tenaga Nasional Berhad, TNB

ID: 12364
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: Audible Noise, Corona Effect, Noise Mapping, Noise Modelling, OHL

Advances in Acoustic Modelling of Overhead Transmission Lines

D. TODOROVIĆ[1], I. SALOM[2], N. PETROVIĆ[3], V. ČELEBIĆ[2], M. KABOVIĆ[2], N. CUROVIĆ[4]
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ID: 12424
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)

Sustainable lattice towers for 380kV transmission lines

K. GÜNTHER-PAPADOPOULOU[1], J. GLÖGGLER[1], R. JACOB[2]
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ID: 12491
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: audible noise, corona discharges, overhead line conductors, surface analysis

The Effect of Ageing on Corona Discharge induced Audible Noise of Overhead Line Conductors

B. SCHRÖDER[1], S. MÖLLENBECK[1], P. GIT[2], K. SCHILLAI[3], P. GIT[5], H. KIRCHNER[6], O. PISCHLER[4]
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ID: 12599
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Sustainability and climate change impacts (with C3)
Keywords: High Intensity Localized Winds, Downburst, Transmission lines, Semi-analytical methodology, Finite Element Analysis, CFD, Newton-Raphson, Conductor swing, Structural assessment

Evaluation of Downburst Impact in the Electric Reliability of Transmission Line Spans Through Numerical Analysis

I. SOUZA[1], C. ARRUDA[2]
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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS

B3 PS1 - Innovative substation concepts, designs and operation experience

ID: 10164
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience

Soil Ionization Impact on the Grounding Grid Performance of High Voltage Substations Exposed to Lightning Strokes

O. GOUDA[1], A. ELDEIN[2], S. YASSIN[3], A. ELMORSHEDY[1]
[1]Cairo University; [2]Aswan University; [3]Upper Egypt Electricity Company

ID: 10389
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: AI-Driven, Designs, Brownfield

AI-Driven Solutions for Efficient Generation and Optimisation of Substation Designs in Brownfield Context.

M. SURACE, M. RICHARD
APD Global, Australia

ID: 10436
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Battery Energy Storage System (BESS), Receiving substation (RSS), Energy Management system (EMS), Battery Management system (BMS), State of Charge (SOC)

DG Set Replacement With Bess

R. SAHU*, R. KOPEWAR, S. MALI, M. SHINDE
Tata Power Co. Ltd , INDIA

ID: 10438
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience

Structural Simulation of Gas Insulated Line Support Structures in GIS Substations

M. SUDAN*, V. K, G. k. A
GERETPL, INDIA

ID: 10443
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: gantry, architecture, space, constrained, Voltage, Substation

Innovative Multi-Tier gantry architecture enabling compact twin line exit in space constrained Multiple Voltage Substation using Intelligent Modelling

G. VIG*, J. KUMAR, V. KAPIL, A. SINHA
BHEL , INDIA

ID: 10445
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Digitalization, Substation, Engineering

Digitalization in Substation Engineering

B. MINOCHA*, G. HARIHARAN
L&T Construction, INDIA

ID: 10450
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: VFTO, voltages, TGPR, EHV/UHV, GIS, switching, earthing.

Minimising VFTO voltages & TGPR rise in EHV/UHV GIS station by adopting alternate switching sequence & additional earthing.

A H. V. KUMAR*, T H. PRASAD, M P. KUMAR
POWERGRID, INDIA

ID: 10684
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience

Keywords: Substation Resilience - Digital Twin - Data Fusion - Impact Assessment - Sustainability - Predictive Asset Health - Utility Investment - Big Data

An AI-Driven Framework for Substation Physical Resilience Indexing: Leveraging Big Data for Predictive Asset Health and Investment

C. LI
Burns & McDonnell, United States of America

ID: 10686
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Dead Tank Circuit Breaker - Installation and Commissioning - Installed Base - Gas Analysis - Operational Experience - SF6-free Circuit Breaker

Return of Experience from Installation, Commissioning and Operation of the World's First Modern SF6-free 420 kV Dead Tank Circuit Breaker

J. GRORI[1], P. MELZEN[1], M. CUPPETT[2], M. SCHMITT[2], D. PERSAD[2], A. HOSSAIN[2], T. SCHULZ[2], M. GATZSCHE[3]
[1]Eversource Energy, United States of America; [2]Hitachi Energy, United States of America; [3]Hitachi Energy, Switzerland

ID: 10691
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Floating Offshore Substation - HVDC - Floater Design - Tension Leg Platform (TLP) - Finite Element Analysis (FEA) - Global Performance - Qualification Tests - Wave Basin Model Test

Conceptual Design of an HVDC Tension Leg Platform (TLP) Floating Offshore Substation Solution

H. SONG[1], Z. TANG[2], N. MOLINIER[3], C. PLET[4]
[1]GE Vernova, United States of America; [2]Genesis Energies, United States of America; [3]GE Vernova, United Kingdom; [4]GE Vernova, France

ID: 10692
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Substation - 3D Models - Intelligent Symbols - Digital Twin - LiDAR - Photogrammetry - Resilience

Implementing Intelligent Substation 3D Design with Data Capture Technology

D. LEWIS, S. BOZIC
Bentley Systems, United States of America

ID: 10748
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Substation Earthing - Touch and Step Voltages - Soil Freezing - Seasonal Earthing Performance

Analysis of Seasonal Effects on Substation Earthing Systems

D. LEWIS[1], R. ANDOLFATO[2], D. CUCCAROLLO[2]
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ID: 10808
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Building Information Modeling - BIM - Asset Information Model - AIM - Information Management Initiative - IMI - GeoBIM - IEC 61850

BIM 2.0 for Substations: Unlocking the Potential of Data to Improve Electrical Grid Operation and Maintenance

P. SOMBOONYANON[1], B. PALMER[2], B. S. MORENO[2]
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ID: 10834
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Artificial Intelligence, Generative AI, Knowledge Management, SECI Model, Substation Lifecycle, Virtual Mentor

Leveraging generative AI to facilitate Knowledge Management across Substation Lifecycle

S. NOGUCHI
Chubu Electric Power Grid Co., Inc. Japan

ID: 10835
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Foundation Construction, High Skilled Engineer, Precast RC Foundations

Reduction of Construction Period by Applying Precast RC Foundations to Substation Equipment

K. MURAKITA, S. TSUKAO, M. YOSHIMOTO, K. ENDO, D. SAITO, C. SASAKI

TEPCO Power Grid, Inc. Japan

ID: 10877
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Generative Design - Computational Design - BIM - Sustainability - Embodied Carbon

Greening the Grid - More Sustainable Design of Electrical Substations using a 3D BIM Model Integrated with Generative Design Approach

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[1]AEC Lionstech, United States of America; [2]Burns & McDonnell, United States of America; [3]Burns & McDonnell, United Kingdom

ID: 11030
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Atacama Desert, resistivity surveys, 1D geoelectric modeling, geophysical surveys

The Kimal Converter Substation - The Challenges of Geoelectric Modeling in a Desert Environment

P. E. FREIRE[1], N. MEQBEL[2], S. BITTENCOURT[3], T. WEI[4], W. JIANZHONG[5], B. ABARCA[6], J. CALDERON[6]
[1]PAIOL Engenharia Brazil; [2]3D Consulting-Geo Germany; [3]Consultant Brazil; [4]China Energy Engineering Group Guangdong Electric Power Design Institute CO., Ltd. China; [5]China Southern Power Grid International Co., Ltd. China; [6]Conexión Energia Chile

ID: 11300
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Substation; Power Generation; GEOBIM; Reality Capture; GIS; Point Cloud; Digital Twin; BIM; EletroBIM Project

GeoBIM Implementation for the Development of Transmission Projects and Digital Twins for the Optimization of Substation Management in Operation

A. MAROTTI[1], P. BRITO[1], F. SILVA[1], V. CARAZZAI[1], C. XAVIER[1], D. ARAÚJO[2], R. AGUIAR[3]
[1]ELETROBRAS Brazil; [2]BIM Start Brazil; [3]EnergiaBIM Brazil

ID: 11302
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: BIM, FITradeoff, substations, multicriteria analysis, sustainability

Application of the FITradeoff Method in Substation BIM Projects: Multicriteria Optimization for Decision Making

H. VILELA[1], L. VASCONCELOS[2]
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ID: 11616
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Substation, mobile, modular, temporary, standardisation, sustainability, efficiency, NetZero

Mobile and modular Substations for the provision of more sustainable and efficient Grid Connection of renewable Generation

P. CURTIS, B. JAVAID, T. WANKHEDE, J. THOMAS, H. MORTON, M. BARNETT, M. MORREY, A. CHAUDHR
SSEN Transmission United Kingdom

ID: 11813
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience

Prefabricated modular substations: Findings from ongoing pilot project

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ID: 11997
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Sustainability, Transmission, GIS, SF6-free, F-gas-free, Vacuum, GHG emission

F-gas-free 420 kV GIS based on clean air and vacuum switching technology

M. KUSCHEL[1], B. LEEMANS[2], V. AELBRECHT[3], K. POHLINK[4], C. BÜTÜNER[5], F. KELCH[6], A. NIJHUIS[7], M. ROLF[8]
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ID: 12004
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Sustainability, Mobile substation, Compact, GIS, SF6-free, F-gas-free, Vacuum, GHG emission, LPIT, Low Power Instrument Transformers

Innovative greenhouse gas free mobile substation

A. ALBERT[1], M. WEIHKOPF[2], M. KUSCHEL[3], P. MENKE[4], L. E. DAHL[5], L. I. STADHEIM[6]
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ID: 12057
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Anomaly detection, Condition-based maintenance, High voltage substation, Inspection robot, Thermal imaging

Experience from Pilot Implementation of Substation Inspection Robots in Thailand's High Voltage Substations

S. ARIDEJ, S. LAOHANAN
Electricity Generating Authority of Thailand (EGAT)

ID: 12059
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: BEP, BIM, Data Standardization, Interoperability, Substation Design

BIM in High Voltage Substations: Implementation, Data Gaps, and Readiness for Integration

K. DHANAVARAVIBUL, N. TANTASANEE, N. SRIPRASERT
Electricity Generating Authority of Thailand (EGAT)

ID: 12201
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience

Formulation of advanced design standards for HV/MV Substations to optimize and utilize renewable resources in construction, operation and maintenance: Technical challenges and lessons learned

M. S. RINCON[1], J. A. BETANCOURT[2], C. J. SEPULVEDA[3], J. CASTRO[4]
[1]CELSIA; [2]CELSIA; [3]CELSIA; [4]CELSIA

ID: 12207
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience

Digital Twin for Operational Optimization of High Voltage Electrical Substations

L. MONSALVE[1], M. PALACIO[2]
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ID: 12209
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience

Grounding protection studying Substations in Industrial Zones – Insights, Innovations, and Challenges

F. GIRALDO[1], E. OSPINA[2], M. PALACIO[3]
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ID: 12272
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience

Automated Generation of Substation 3D Model via Python and 3D CAD Integration

N. ANAYA[1], E. CEBALLOS[2], A. LARIOS[2], J. ARCILA[2]
[1]ISA; [2]HMV

ID: 12279
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: availability, resilience, feeder, circuit breaker, substation, moebius-strip

A Comparison of three resilient HVAC Switchyards: Moebius-Strip, Crossed-Ring and Breaker-and-a-Half

G. KOEPPL[1], K.-P. BRAND[2], M. STOECKLI[3]
[1]Koeppl Power Experts (ex); [2]ABB Power Systems (ex); [3]ELECTROSUISSE / CIGRE Switzerland NC Secretary

ID: 12307
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience

Implementation of Modular Substations to Address the Challenges of Traditional Substations in Tenaga Nasional Berhad Grid System

S. MUTHUKARUPPAN, M. Z. ZAINAL ARIFFIN
Tenaga Nasional Berhad, TNB

ID: 12603
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Modular electrical substations, Architectural design optimization, Construction time reduction, Industrial projects, Energy infrastructure

Innovative Design of Modular and Prefabricated Electrical Substations with an Approach to Reduce Execution Time and Increase Productivity in Industrial and Energy Projects

H. ABEDI
Monenco Iran Consulting Engineers Co. Iran

ID: 12635
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Innovative substation concepts, designs and operation experience
Keywords: Emergency training, neural network, substation

Intelligent Emergency Training System for Substation Operating Personnel Based on Digital Simulation and Neural Network Technologies

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Branch of PJSC «Rosseti – Krasnoyarsk Enterprise of Main Electric Networks Russia

B3 PS2 - Life cycle & asset management

ID: 10158
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Asset Management - Technical Drivers - Business Context - Bushings - Spares

Challenges in Asset Management: Data, Decisions and Uncertainty

T. MCGRAIL[1], R. DHIRR[4], L. PAULHIAC[5], J. BEARDSALL[6], C. JOHNSTONE[7], S. SUTTON[2], G. WILSON[3], M. KHALIL[2]
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ID: 10278
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Sulphur Hexafluoride – emission – reducing – sealing

Mitigating SF6-emissions: Performance evaluation of external adhesives as leakage mitigation in simulated and field conditions

J. VAN ONNA[1], R. VOSSE[2]
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ID: 10344
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Substation SCADA, Circuit Breaker, Network Reliability

Application of Substation SCADA Data for Circuit Breaker Maintenance Optimisation and Network Reliability

J. KHOR, L. NARANPANAWE
Energy Queensland, Australia

ID: 10351
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Sulphur Hexaflouride (SF6), HV, Transmission

Sulphur Hexaflouride (SF6) Management Strategy in Transgrid's HV Transmission Network

A. PIANCA, E. LAMPLOUGH
Transgrid, Australia

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Topics: B3 PS2 - Life cycle & asset management
Keywords: SF6

SF6 Life Cycle Management strategy by GETCO

K. RATHOD, A. PIPARIA, P. PATEL, U. VANK*
Gujarat Energy Transmission Co. Ltd, INDIA

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
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Cumulative Impact of Frequent Through Faults on Conventional Substation Switchyard Equipment: Diagnostics and Long-Term Mitigation Strategies

R. BHAKAL*, P. K. JHA, K. SAHU
POWERGRID , INDIA

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: AIS, substations, Hybrid, Grid

Hybrid Grid for enhancing capacity of AIS substations with space limitation with use of GIS switchgear

A. KUMAR*, S. GOSWAMI, K. BHATT, A. GARG, N. KAUSHIK
TATA Power DDL, INDIA

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Substation, Extension, Upgrading

Substation Extension & Upgrading Experience

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: GIS, AIS, Ageing, Operational, Challenges

“POWERGRID’s Experience in Revamping Ageing AIS Infrastructure: GIS Upgradation Strategies Under Site-Specific and Operational Challenges”

A. CHAKRABORTY, A. VAISH, M. K. TIWARI, R. GUPTA
POWERGRID, India

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: AIS, GIS, Gas, Refinery, 66kV

Replacement and Upgrade of a 66kV AIS to GIS at a Major Gas Refinery in India: A Phased Execution Strategy

V S MEENA*, D. SENGUPTA, M. S MEHTA, V. KAPIL
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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: EHV, Failure, Risk

Risk Based Inventory Management of EHV Equipment Through Failure Modes and Effects Analysis

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POWERGRID, India

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Augmented, Substation

Enhancing Substation Asset Management with Intelligent Inspection and Augmented Reality in POWERGRID

D. PAUL*, D. N. JHA, M. K. KALORIA, K. SAHU, N. SRIVASTAVA
POWERGRID, India

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers

Topics: B3 PS2 - Life cycle & asset management
Keywords: Substation, Hydro Plant, Up-Rating

Substation Up-Rating Challenges and Solutions in a Live Hydro Plant Environment

P. CHAWLA *, D. MANDAL, D. K SHUKLA, V. KAPIL
BHEL INDIA

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Ageing, Bus Reactor, Foundation modification, Reactor replacement.

Replacement of 400kV, 63 MVAR Aged Reactor with 400kV, 125 MVAR Reactor on the Same Foundation: Challenges, Modifications, and Lessons Learnt

T. SUDHIR*[1], V. S. RAMESH[2], C GOBINATH[3], P. MURTHY[4]
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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management

Powering the Northeast India: "A Case study on the timely completion of 220KV Transmission Project in adverse climatic conditions and various logistical challenges"

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POWERGRID, INDIA

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management

Role of Online PD Monitoring of GIS in Enhancing Reliability & Avoiding Catastrophic Damage: A Utility Experience and Perspectiv

M. G. GOKHALE[1], S. ADHIKARI[2], N. K. SINGH*[2], A. TIWARY[2], J. PANI[2], P. KUMAR[2]
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ID: 10696
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Smart meter, real-time, alarm, edge, LV Network

Substation Metering Equipment to improve Real-time Monitoring of the LV Network

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ID: 10738
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Gas-insulated substation, GIS, SF6-free, C4FN, C4F7N, fluoronitrile, extension, upgrading, retrofitting, retrofilling

Extension and upgrading of 420 kV GIS with SF6-free C4FN GIS solution

A. FICHEUX[1], T. BARBE[1], A. HOLTON[2], C. EDGAR[2]
[1]GE Vernova; [2]SP Energy Networks

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Asset Performance Management, Circuit Breaker, Condition-based Maintenance, Controlled Switching, IEC 61850, IED, Monitoring

How combining controlled switching functions with extensive monitoring improves operation of circuit breakers

N. GADACZ, F. AIT-ABDELMALEK
GE Vernova

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Switchgear, Monitoring, Anomaly Sign, Dry Air, Partial Discharge

Anomaly Detection Technology for Gas-Insulated Switchgear

T. MORI, D. MATSUMOTO, M. MIYASHITA, Y. TAKAHARA
Mitsubishi Electric Corporation Japan

ID: 10837
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: SF6 Free, Natural Origin Gas (NOG), Gas Insulated Switchgear (GIS), Dry Air, Vacuum Circuit Breaker (VCB), Cubicle Type GIS

Current Status of Application and Operational Experience of Alternative Switchgears using Natural-Origin Gases in Japan

K. SASAMORI[1], T. MORI[1], T. SAIDA[2], N. KIKUCHI[3], A. HATSUZAKI[4], S. TSUKAO[5], K. MURAKITA[5]
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ID: 10839
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Life Cycle Assessment, Carbon Footprint, Carbon Dioxide Equivalent, Emission, Sulphur Hexafluoride, Alternative Gas, Substation, Service Life

Life-Cycle Based Carbon Footprint Assessment and Evaluation of Reduction Measures for AIS and GIS Substations

S. AICHI[1], S. NOGUCHI[1], S. TSUKAO[2], M. HORIGOME[3], T. UCHII[4], R. TAKAHASHI[4]
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ID: 10840
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Ageing Equipment, Maintenance, Collaboration, Renewal Simulation, Asset Management, Failure Response

Collaboration between Utilities and Manufacturers for Sustainable Operation and Maintenance of Ageing Substation Equipment

K. MIKUNI[1], T. KAWAMURA[1], Y. ITO[1], S. MATSUDA[2], M. YAEGASHI[2]
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ID: 11075
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: circular economy, data collection, digitalization, disposal minimization, emission reduction, greenhouse gas mitigation, monitoring, regeneration, recycling, SF_6, SF_6 lifecycle, sustainability

SF_6 Monitoring, Recycling and Regeneration: Circular Solutions for the Energy Sector

S. PIROLA
SYNECOM

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: asset life extension, equipment uprating, lifecycle assessment, retrofit design, structural reuse, substation refurbishment, sustainable engineering

Optimising substation refurbishment through reuse and modification of existing steel support structures: A case study at a 132 kV substation

B. HAJEE, A. MAYET, M. PEFFER
National Transmission Company South Africa (NTCSA)

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: coupled electromagnetic-structural analysis, electrical fault loading, electromagnetic loading, short-circuit forces, substation structures, voltage uprating

Structural engineering challenges in short-circuit loading: Toward a unified methodology

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National Transmission Company South Africa (NTCSA)

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Asset Management, Power Grid Companies, Power Supply Reliability, Production Asset Management System, Production Asset Management Model, automated system of technical survey facilities

Digital Technology Enabled Technical Survey

D. VODENNIKOV, Y. ZHILKINA, S. ZAKIROVA
PJSC ROSSETI

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Availability, Substations, Shunt Reactors, Spare-Reactor Switching, Life-Cycle Asset

Life-Cycle Asset Management of Non-Switchable Line Reactors: Rapid Reserve Switching in Brazil's Interconnected Power System

F. FRAGA[1], E. PINTO[1], A. LACERDA[2]
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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Transformers ; energy transition ; uprating ; transmission margin; hybridization

Challenges in substation uprating to support Brazilian wind complex expansion

C. XAVIER, M. M. DELLABIANCA, S. PINHEIRO, L. BRAGA, R. RAMOS
ELETROBRAS Brazil

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Building Information Modeling; Extra High Voltage Substation; Digital Twin Models; Current Transformers; Non-invasive Monitoring; Partial Discharges; HFCT; Extra High Voltage Substation; Digital Twin Models; Artificial Intelligence (AI); IoT; GeoBIM

Using GeoBIM, IoT and IA for Predictive Diagnose on High- Voltage Substations

A. MAROTTI[1], F. SALLES[1], G. LIMA[2], F. MACHADO[3]
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Assessing Risk Factors for PD-Activity in 24 kV Secondary Substations Using Machine Learning

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Asset Management, Maintenance Strategies, Risk Assessment, Health Index, Decision Making, Substation

Application of Substation Asset Management Solution for a Utility in Malaysia under the Korea's KSP Initiative

S. J. KIM[1], H. W. CHA[1], H. D. SEO[1], T. W. AHN[2], J. H. BAN[2], J. S. KIM[3], J. W. KIM[3], W. S. LEE[3], R. LIM[4]
[1]Hyosung Corporation; [2]Hyosung Heavy Industries; [3]Korea Electric Power Corporation; [4]Sabah Electricity Sdn. Bhd.

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Topics: B3 PS2 - Life cycle & asset management

Case study: Stock-up strategy for equipment with High-Lead-Time spares in offshore substations

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Ørsted Offshore Wind Power

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Topics: B3 PS2 - Life cycle & asset management
Keywords: Seismic requirements, seismic interaction, subduction earthquakes, seismic shear waves

Similarities and Differences of Chilean Seismic Requirements with IEEE 693-2018

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Structural & Seismic Consultant

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Topics: B3 PS2 - Life cycle & asset management

Assembly of GIS Substations: The critical link to ensure performance, reliability and longevity

M. M. MEZA[1], J. S. SANCHEZ[2]
[1]ISA; [2]ISA

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Reliability and Cost Strategies in Operations and Maintenance: Agile Framework for Operational Excellence

E. CANTOR[1], A. PATIÑO[2], F. DIAZ[3]
[1]Intercolombia; [2]intercolombia; [3]ISA

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Transforming Data into Decisions: A Model to Maximize Asset Reliability

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Revitalization of the power grid: Improvement, renovation and increase of short-circuit capacity in substations

M. PALACIO
HMV

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: SF6 alternatives, GIS, GIL, transmission, disconnector, earthing switch, C4-FN, fluoronitrile, gas handling, retrofill, installed base, gas-insulated switchgear, gas-insulated line

Retrofill of 420 kV and 550 kV gas-insulated Switchgear and Lines: Another Step towards the Decarbonisation of High-Voltage Switchgear installed Base

P. BERNER[1], D. CHRISTEN[1], T. JORGE[1], S. PACHLATKO[1], K. STEINEMANN[1], M. STOECKLI[2]
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Smart Spares Consulting' - Maximizing GIS asset resiliency and availability through a cost-, risk-, and utilization-optimized strategic spares approach leveraging existing inventory

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Investigations on detection sensitivity of partial discharge defects in various high-voltage GIS configurations with synthetic air and SF6 insulation

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: Voltage-Stability, STATCOM, Interface-Flow, Reactive-Power, Master-Controller, Operation-Maintenance

The largest 1 Gvar STATCOM Deployment in the Korean Power System: Architecture, Control, and Operational Approach

J. AHN
Hyosung Heavy Industries Republic of KOREA

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Life cycle & asset management
Keywords: BESS planning, substations, Li-ion technology, self-consumption

Optimized Planning of Battery Storage for Substation Auxiliary Power

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B3 PS3 - Grid transformation and new reliability threats

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Topics: B3 PS3 - Grid transformation and new reliability threats
Keywords: Substation, Storage, Optimisation

Substation Battery Energy Storage as an Optimisation Application in Power Systems

P. TONKING[1], D. GRAY[1], J. SUSTANTO[2], C. COSTAN[3], A. RENSHAW[4]
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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats
Keywords: Condition, Monitoring, Substation, Assets, Twin

Digital Twin Enabled Advanced Condition Monitoring of Substation Assets

D. PAUL*, D. N. JHA, M. K. KALORIA, K. SAHU, N. SRIVASTAVA
POWERGRID India

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats
Keywords: GIS, Substation, Design, Hydroelectric

Innovative GIS Substation Design Solutions for Overcoming Engineering Challenges in Hydroelectric Project

B. YADAV*, D. SHUKLA, V. KAPIL
BHEL, INDIA

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats
Keywords: Grid, SC, test, Laboratory, substation, bus-bar

Reliable & safe Grid connectivity of SC test Laboratory, innovatively using substation bus-bar design

R. K. PATEL*[1], R. ARORA[1], Y. DIXIT[2]
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Assessment of Very Fast Transient Over voltage in GIS Substation through Physical Measurements and System Studies

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Offshore Substation in India : A case study on planning of associated transformation capacity and Reactive compensation schemes for evacuation of power generated through off shore wind system-Gujrat

D. D. CHAKRABORTY*, S. PAUL, A. KUMAR, S. RAY
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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats
Keywords: Grid, Reinforcement

Grid Expansion and Reinforcement of existing National Grid of Uganda

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Power Grid Corporation of India Ltd

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats
Keywords: climate change, offsite power supply, reliability, severe heat, substation control house, switchyard

Design and Operational Considerations for EHV Substation in Nuclear Power Plants in a Changing Climate

D. JOUAN, R. CLERT
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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats
Keywords: Mobile Substation - Gas Insulated Switchgear (GIS) - Temporary Mobile Substation (TMS) - Equipotential Zone Grounding (EPZ) - Power Line Carrier (PLC) - LTE Communication

Temporary Mobile Substations: A Solution for Modern Grid Expansion Challenges

B. GUREVICH, S. FITZGERALD
ComEd, United States of America

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats
Keywords: Substation Seismic Designs - Equipment Seismic Qualification - IEEE 693 - IEC 62271 - ETG-A.0.20 - GB 50260

Evaluating Current Standards of Seismic Qualifications of Substation Equipment and Applying to Other Regions of the World

P. SOMBOONYANON[1], C. BOWEN[2]
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ID: 11074
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats
Keywords: Resilience, Seismicity, Seismic Qualification, Overturning, Earthquake, Transformers, Reactors

Innovative Solutions for Enhancing the National Transmission Grid Seismic Resilience

S. MANDOSI
TERNA

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats

Mobile Substations: Rapid Response Solutions for Reliability Threats

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ID: 11101
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats
Keywords: HVDC, composite insulators, creepage distance, seismic demand, finite element method.

Use of composite insulators for HVDC disconnectors in seismic areas

D. MOMESSO
GE Vernova

ID: 11314
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats
Keywords: Climate Change, Conductors, Extreme Events, Forces, Insulator strings, Wind

Technical Evaluation of Wind Load Design Criteria for Bus Structures in High-Voltage Substations Based on Technical Standards

E. PINTO[1], F. FRAGA[1], F. ALVARES[1], L. PESSOA[1], A. MACEDO[2], M. SILVA[3]
[1]ELETROBRAS Brazil; [2]UFRPE University Brazil; [3]Volga Engenharia Brazil

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Topics: B3 PS3 - Grid transformation and new reliability threats

Secondary Seismic Response Method for HV Equipment on Offshore Platform

D. BACKSTROM
Hitachi Energy

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats

Smart Access Control to Substations

F. J. BALLESTEROS RUIZ
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ID: 11534
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats
Keywords: Wildfire, Wind Turbine, Battery Energy Storage Sites (BESS)

Resilience of Substations to External Hazards

A. ALOK, N. THOMSON, R. SLAUGHTER
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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats

Designing Structural Supports for High-Voltage Electrical Equipment Using Dynamic Equivalency Models

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ID: 12284
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats
Keywords: gas insulated switchgear, GIS, standardisation, product quality, alternative gas

Modular and prefabricated GIS Product Platform

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats

Analysis and Design of Grounding Systems in High-Resistivity Soils for Large Electrical Installations

C. MARCONETTO[1], J. D. VEGA[2], A. E. MUSTO[3]
[1]Grupo Estudios Electricos; [2]Grupo Estudios Electricos; [3]Grupo Estudios Electricos

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS3 - Grid transformation and new reliability threats

Electric Field Stabilisation Technology in the Protection Against Lightning Strikes

S. HORSLEY
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B4 DC SYSTEMS AND POWER ELECTRONICS

B4 PS1 - DC equipment and systems

ID: 10121
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Cable, Direct Current, Fault, High Voltage, Measurement, Protection, Simulation

Trade-offs in HVDC Protection System Design – Investigation into Protection Margin and Threshold Setting for Future DC Grids

P. M. BAENA GARCIA, G. CHAFFEY, D. VAN HERTEM
KU Leuven, Belgium

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Design methods, Electrical Energy Hubs, Multiterminal, HVDC, Protection

Protection system design for HVDC switching stations and electrical energy hubs

M. VAN DEYCK, G. CHAFFEY, D. VAN HERTEM
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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC, Robotic Inspection, Thermal Anomaly Detection, Preventive Maintenance

Development of an analysis tool utilizing robotic image acquisition for early detection of thermal anomalies in HVDC converter equipment

P. VIALON[1], G. FRÜBING[1], R. LOLLIER[2], R. KOMOROWSKI[1]
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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: KEYWORDS Bipole, Power Electronics Module, Offshore Interconnections, VSC HVDC, Wind Farms, MTDC, Harmonics, Transient Recovery Voltage

±525kV 2GW Bipole VSC-HVDC Offshore Transmission Projects – Critical Review and Status Updates

S. KABUL[1], A. KUMAR[1], B. KOX[2], K. DYKE[1], B. HOUSTEN[1], R. WINZENBURG[2]
[1]GE Vernova; [2]TenneT TSO

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC, VSC, CROSS-BORDER, RESILIENT, POWER, GRID

Cross-Border And Mainland - Island Connectivity: Vsc Based Hvdc Under Sea Links For A Resilient Power Grid

D. M ROY*, A. SUNDARAN, D. P. TYAGI, S. KUMAR
POWERGRID INDIA

ID: 10555
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Switchyard, HVDC, Circuit Breakers

Analysis of DC Switchyard Schemes for Multi-Terminal HVDC Systems with DC Circuit Breakers

V. K*[1], S. MATURU[1], Y.-J. HAFNER[2]
[1]Hitachi Energy, India; [2]Hitachi Energy, Sweden

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems

Operational Experience of HVDC Insulators under Climatic Variations & pollution deposit conditions in ±800 KV indoor DC Yard at Agra Terminal of NEA800 HVDC link and mitigations thereof

A. BANSAL*, L K PANDEY, S. SUROJ, P. SHARMA
Power Grid Corporation of India Limited , INDIA

ID: 10557
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC Control Strategy Parallel Bi-pole, ±800 kV UHVDC Current Balancing, DMR, NBGS Multi-terminal HVDC Pole Outage Mitigation, DC Line Fault.

Control Strategy for Current Balancing in parallel Bi-pole for ±800 kV HVDC System with Dedicated Metallic Return (DMR) - Users Perspective

D. KUMAR*, N V. RAO, D. P. TYAGI, K. PV, P P N. THALIB, S. KUMAR
POWERGRID, INDIA

ID: 10558
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: 800kV, HVDC, power flow

Design and system studies consideration for enhancement of reverse power flow capacity of ± 800kV HVDC system.

D. KUMAR*, N. ADARI, S. K. CHOUDHARY, D. P. TYAGI, D. S. SEN
POWERGRID, INDIA

ID: 10559
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Operational, VSC-HVDC, Reactive Power

Operational Experience of Steady-State and Dynamic Reactive Power Capabilities of the Pugalur–Thrissur VSC-HVDC System

A. K MATHEW*, N. T. PP, S. P SANTOSH, A. RAJU
POWERGRID INDIA

ID: 10560
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: ± 320 kV/1000, VSC-HVDC

Planning and Design of a ± 320 kV/1000 MW Hybrid City-Infeed VSC-HVDC Link

A. THORAT *, J. KHAN*, M. AMBARDEKAR, S. KAREKAR
Adani Electricity, INDIA

ID: 10561
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Neutral, Rigid, Bipole, VSC-HVDC

Impact Assessment of Converter Neutral Grounding on Transient Performance in Rigid Bipole VSC-HVDC Systems

A. SINGH*[1], N. SHARMA[1], J. CAWTHORNE[2], A. PASHAEI[3], J. A. MORALES[3]
[1]GE Vernova, INDIA; [2]GE Vernova, United Kingdom; [3]National Grid, United Kingdom

ID: 10563
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: ±320kV, VSC, HVDC, DC, Line, Fault

DC Line Fault Recovery Performance of the India's first ±320kV VSC HVDC Pugalur-Thrissur Link

N. KUMAR*, A. B CHANDRAN, P. TYAG
POWERGRID INDIA

ID: 10565
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: VSC, LCC, Renewable Energy, Grid-forming

Design Considerations for LCC & VSC HVDC for integration with Large-Scale Renewable Energy (RE) - User's Perspective

N. KUMAR*, S. B. C, P. TYAGI, S. BARIK
POWERGRID , INDIA

ID: 10567
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Transient, Overvoltage, IBR, 800kV, HVDC

Transient Over-voltage Studies of ±800kV, 6000 MW LCC HVDC connected with RE source of Solar and Wind

N. KUMAR, A. B CHANDRAN*, P. TYAGI, A. BANSAL
POWERGRID INDIA

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: OLTC Hunting, Gamma Control, kC-Factor

Operational experience and analysis of Hunting interaction between OLTCs of converter transformers due to Current sharing (Kc) factor influence and AC grid Voltage differences of parallel inverters in Multi terminal HVDC systems.

Y. MISAL*, A. SWAIN, M. K. KUMAR, S. MEENA, N. B ADARI
POWERGRID INDIA

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems

Life assessment and refurbishment of ±500kV, 2500 MW Talcher-Kolar HVDC Converter Stations

S. .. S. SANTOSH, K. P.V, N. KUMAR, V DIWAKAR*
POWERGRID, INDIA

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems

Analysis of Higher 5th Order Harmonics & tripping of Type 3 filters (5/27) at HVDC Rihand & Dadri terminals

S. K. CHOUBEY*, N. BABU, P. SHARMA, Y. D. DIXIT
POWERGRID, INDIA

ID: 10774
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Equivalent Network Model, Jacobian Transfer Matrix, Grid Forming performance

Dynamic Equivalent Network Methods for Grid Forming Performance Test

H. SAAD[1], V. COSTAN[2], J. MICHEL[3], D. PIERSON[4], A. NICHOLS[4], R. MAJUMDER[4], M. VOR DEM BERGE[3]
[1]ACDC Transient; [2]RTE France; [3]RTE-I; [4]Invenergy

ID: 10775
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC, MTDC, HVDC Planning, HVDC Control, HVDC Protection, reliability, resilience

Integrating protection and control in the reliability and resilience-informed planning of future MTDC grids

J. C. GONZALEZ-TORRES[1], F. PEREZ[1], E. WITZ[1], A. BENCHAIB[1], N. BARLA[1], B. PERREYON[1], M. PANTELI[2], S. HASHEMI[2], S. JANKOVIC[3], C. FOOTE[4], C. MACIVER[5]
[1]SuperGrid Institute; [2]University of Cyprus; [3]TenneT; [4]The National HVDC Centre; [5]University of Strathclyde

ID: 10780
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC, offshore wind, converter transformer, technical-economic, risk assessment

Converter transformer in HVDC offshore projects: an approach for risk assessment

T. VU-CONG, J.-C. RIBOUD, M. SCHUDEL
RTE France

ID: 10783
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: EMT-type simulation, Bipolar HVDC transmission system, Modular Multilevel Converter (MMC), Voltage source converter (VSC), Real-Time Simulation, Hardware-in-the-loop (HIL), sparse matrix solver, Parallel simulation, Compensation method, Factorization

Optimized Real-time simulation for VSC-HVDC bipolar scheme with physical control replica in the loop

B. BRUNED, B. DE FOUCAUD, S. DENNETIERE
RTE France

ID: 10786
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC, PQU diagram, HVDC connected offshore wind farms.

PQU diagram capabilities and operational needs for offshore HVDC converter stations

K. VERSHININ, T. VU, M. SCHUDEL, T. PREVOST, L. GARBAY
RTE France

ID: 10788
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Commissioning, offshore, transmission tests, heat-run

Risk analysis of offshore commissioning during power transmission tests

M. SCHUDEL[1], M. HORSNELL[2], S. JAPOKIC[1]
[1]RTE France; [2]IMES Group

ID: 10815
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers

Topics: B4 PS1 - DC equipment and systems
Keywords: RoCoF (Rate of Change of frequency), SC: Synchronous condensers, BESS: Battery Energy Storage Systems, PSP: Pump Storage Plants, VRE: Variable Renewable Energy, IBR: Inverter Based Sources, FRT: Fault Ride Through.

Enhancing Grid Stability in High Renewable Penetration Environments: Field implementation of STATCOMs in the Indian Power System

R. S. CHAUDHARY, R. GUPTA, P. PANDEY, A. LAHIRI*, R. SRIVASTAVA, A. DUBEY
POWEGRID INDIA

ID: 10939
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Aging, Asset Management, C&P (Control and Protection), Multivendor, Thyristor Module, Update

Confirmation test in refurbishment of the control and protection system devices and thyristor valve modules in the 300 MW Shin-Shinano No.2 frequency converter

Y. AIHARA[1], M. TAKECHI[1], K. AOKI[1], T. SATO[2], Y. NAKAIDE[3]
[1]TEPCO Power Grid, Inc. Japan; [2]Toshiba Energy Systems & Solutions Co. Japan; [3]Hitachi,Ltd. Japan

ID: 10940
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Black Start, Grid Forming, LCC, VSC

The construction and system study of the Higashi-Shimizu frequency converter station (VSC BTB link)

S. IMAI[1], R. HAJIRI[1], T. MATSUNAGA[1], S. INOUE[2], K. KAMIYAMA[2], T. ASAO[2]
[1]Chubu Electric Power Grid Co., Inc. Japan; [2]Hitachi Energy Japan, Ltd. Japan

ID: 10942
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Floating, Offshore, Converter Station, HVDC, Valve, Tower, Station Post Insulator (SPI), Mechanical Design, Fatigue

Study on mechanical design requirements for HVDC valve tower in floating offshore converter stations

N. SHINOHARA, T. KITAMURA, M. HIRAYAMA, T. YOSHIDA
Mitsubishi Electric Corporation Japan

ID: 11013
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: integrating new HVDC Bipole with existing +/- 800kV HVDC Bipole

Opertional and Commissioning Challenges and mitigation measures while integrating new HVDC Bipole with existing +/- 800kV HVDC Bipole with DMR system

A. B*, S. KIRAN K, D. P. TYAGI
POWERGRID INDIA

ID: 11079
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC, transmission, synchronous grid forming, MCC (MMC), rating.

The Impact of Synchronous Grid Forming on the Rating of HVDC Transmission Links

C. BARKER[1], T. QORIA[2], A. WILLIAMS-KELLY[1]
[1]GE Vernova UK; [2]GE Vernova Germany

ID: 11103
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC Electrode Lines, Cable Faults, HVDC protections

On the analysis of faults along HVDC land electrode lines

S. DE MARIA
TERNA

ID: 11104
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: flashover, high-voltage insulators, insulation performance, pollution stress, salt-fog tests

Insights from salt-fog testing on high-voltage insulators used in HVDC converter stations

A. IOANNIDIS

TERNA

ID: 11130
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC fast-front transients, HVDC switchgear, DCSS, Multi-terminal HVDC, HVDC Commissioning.

Investigation of Fast-Front Transients in HVDC Switchgear for CMS Multiterminal HVDC System

S. GANESAN[1], P. HOFBAUER[1], K. LINDEN[2]
[1]SSEN Transmission UK; [2]Hitachi Energy Sweden

ID: 11285
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Automatic Transfer Scheme (ATS), Intelligent Electronic Devices (IEDs), Zone-Selective Interlocking (ZSI), Highly redundant Auxiliary Systems, GOOSE messaging.

Enhancing Electrical Protection and Automated Control Systems for HVDC Auxiliary Services: A Comprehensive Study Case

T. STOTT[1], J. JARAMILLO[2], M. CORREA[3], C. SMITH[4], A. GARCIA[5]
[1]GE Vernova UK; [2]IEB Colombia; [3]GE Vernova France; [4]RWE UK; [5]GE Vernova Germany

ID: 11305
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC, Synchronous Grid-forming, Inertia, RoCoF.

True Inertia Constant of Synchronous Grid-Forming Control Strategies

C. BARKER[1], T. QORIA[2]
[1]GE Vernova UK; [2]GE Vernova Germany

ID: 11342
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Bipolar MMC–HVDC, Grid-forming control, Reactive power sharing, Asymmetric grid impedance, Impedance compensation, Decentralized control

Grid-Forming Control for Reactive Power Sharing in Bipolar MMC–HVDC Systems Under Asymmetric Grid Conditions

J. KIM[1], J. LEE[1], J. HONG[1], H. JUNG[1], H. KIM[2]
[1]HYOSUNG CORPORATION; [2]Zeta Elec

ID: 11345
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Electromagnetic transient modeling, Multi-terminal HVDC, Network-HILS, DC power transmission

Integrated EMT Modeling and Network-HILS Verification for HVDC Interconnection of the Southwest Offshore Wind Farm in South Korea

S.-S. PARK[1], C.-Y. LEE[2], S.-H. KIM[3], R.-Y. KIM[2]
[1]Korea Electrotechnology Research Institute; [2]Energy Power Electronics Control System Lab, Hanyang University; [3]Korea Electric Power Corporation

ID: 11418
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems

Effect of Temporary VSC-HVDC converter blocking on Multiterminal HVDC and offshore windfarm performance

A. ABDALRAHMAN
Hitachi Energy

ID: 11420
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems

Hierarchical Primary–Secondary Control of HVDC Grids: Challenges of Droop Control Schemes in Ensuring Safe Operation under Large-Scale Renewable Integration

F. Z. DEJENE
Hitachi Energy

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems

Addressing specific challenges for harsh environmental conditions and integration with large solar park for Khavda – Nagpur HVDC transmission

A. KUMAR
Hitachi Energy

ID: 11438
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC, control, protection, replica, maintenance, testing, HIL, real-time

Unlock Capacity through HVDC C&P Replica-as-a-Service Business Model

M. HAGSTRÖM
Hitachi Energy

ID: 11532
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: VSC-HVDC, Micro-sectors, Harmonic stability, Impedance loci, frequency-domain analysis

Micro-sector Analysis of Harmonic Instability for HVDC Systems Interconnected to Weak Grids

H. HUANG, J. MONTEIRO, E. LAVOPA, O. JASIM
GE Vernova United Kingdom

ID: 11547
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC system

Planning and Specification Challenges for Bipole Multiterminal HVDC Systems

P. LI[1], M. HABIBURRAHMAN[1], Z. TALIB[1], L. BAJAJ[1], N. SINGH[1], S. JOSH[1], M. JAVID[1], B. BAUDRY[1], G. ADAM[1], V. MURUGESAN[2], P. BARUPATI[2], P. KUMAR[2]
[1]ENOWA.NEOM; [2]Hitachi Energy

ID: 11594
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Offshore wind power; offshore-onshore integrated grid; onshore DC hub; DC fault ride-through; distributed energy consumption

Multi-terminal HVDC Transmission Technology for Offshore Wind Power Adopting Hybrid Cable-OHL and Its Applications

C. ZOU, T. HOU, Y. LU, Y. HUANG
Electric Power Research Institute, CSG

ID: 11595
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: DC transformer; multilevel current-source converter; two-degree-of-freedom modulation; MMC; DC grid; renewable energy development

Topology and Control of High Transformation Ratio and Large Capacity DC Transformer Based on Multi level Current Source

C. WEI, C. GAO, Z. LIN, K. CHEN
China Electric Power Research Institute

ID: 11597
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: DC circuit breaker, Vacuum interrupter, Artificial current zero, Sub-millisecond interruption time

Sub-Millisecond Artificial Current Zero Interruption of DC Fault Current Using a 40kV Ultra-Fast Vacuum Interrupter

S. LIU, J. CHEN, Z. YUAN, Z. LIU, Y. GENG
Xi'an Jiaotong University

ID: 11598
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Digital transformation; UHVDC transmission project; Quality control; Transient instability of the system; Cross across

Transmission Project of Electric Power Engineering Based on Digital Transformation

W. ZHANG[1], B. CHENG[1], X. LENG[2], S. CHE[3], Y. DONG[2], R. HU[4], Z. ZHENG[5], W. WANG[3]
[1]China Southern Power Grid Co., Ltd.; [2]China Southern Power Grid Energy Development Research Institute; [3]China Southern Power Grid EHV transmission company; [4]China Southern Power Grid Internet Service Co., Ltd.; [5]South China University of Technology

ID: 11599
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Bipolar end-to-end VSC-HVDC, DC overhead line, fault ride through, full-bridge sub-module, half-bridge sub-module, hard-ware-in-the-loop

DC Overhead Line Fault Ride-through Schemes Comparison in End-to-end VSC-HVDC System

X. MA, C. ZHAN, Y. LU, C. JIANG, N. WANG
NR Electric Co., Ltd.

ID: 11600
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: VSC UHVDC, Renewable integration, Fault handling, Fault ride through, EMT simulation

8 GW VSC UHVDC transmission -- Fault handling in the Gansu-Zhejiang ±800 kV project

Z. ZHAO[1,2], Y. XU[1,2], T. LI[1,2], L. FAN[1,2], T. ZOU[1,2], M. ANDERSSON[3], G. WANG[3], J. LU[3]
[1]SGCC; [2]SPERI; [3]Hitachi energy

ID: 11621
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Modular Multi-level Converter, Voltage Sourced Converters, Valve Terminal AC-DC Dielectric Test, Rapid Discharge Circuit, Hybrid Method 1 - Method 2 Test Method

A Review of Practical Approaches to Dielectric Valve Terminal AC-DC Tests for Modular Multi-level Voltage Sourced Converters

F. GUO, J. VODDEN, A. KUMAR, F. ZHOU, R. PREEDY, C. DAVIDSON, S. MOULSON, H. CALDER
GE Vernova Stafford UK

ID: 11633
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems

A Strategy for Enhanced Resilience of the NEOM Grid U-shape HVDC

P. LI, M. HABIBURRAHMAN, G. ADAM, N. SINGH
ENOWA.NEOM

ID: 11724
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC, LCC, Bipole Upgarde, Commissioning Strategy, On-Site Experience

Upgrade of Monopole to Bipole in ±500kV, 3000MW Bukdangjin-Godeok LCC HVDC Link - Strategy and Commissioning Experience

W. YANG[1], I. PARK[1], K. SONG[1], U. LEE[1], Y. KIM[1], Y. JANG[1], N. BHOWMIK[2], H. IM[3]
[1]KAPES; [2]GE Vernova; [3]KEPCO

ID: 11727
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: bipolar, distribution, fault, MVDC, restoration

Restoration Strategy for Bipolar MVDC Systems Following Fault Events

G. C. CHO[1,2], S.-K. KIM[1], J. JEON[1], J. HWANG[1]
[1]Korea Electrotechnology Research Institute; [2]National Research University 'Moscow Power Engineering Institute'

ID: 11765
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Survey, Reliability, HVDC Systems, LCC, VSC, Forced Outages, Unavailability, Availability

Survey of the Reliability of HVDC Systems Throughout World during 2023-2024

P. TAIAROL[1], J. BURROUGHS[2]
[1]Stantec, Canada; [2]Velco, USA

ID: 11771
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems

Design of generation runback scheme for a HVDC-connected wind farm

L. ZENI[1], A. COKIC[1], A. TSYLIN[1], P. MCGARLEY[1], M. PARADIS[2]
[1]Ørsted; [2]ATCO

ID: 11817
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Multi-terminal HVDC; Grid-forming converters; Offshore wind farms; Frequency regulation; Coordinated control; Power sharing.

Coordinated Frequency Support in Multi-Terminal HVDC Network Via Grid-Forming Converter with Dynamic Power Allocation

M. FAWAD[1], A. GARG[1], M. GALEELA[1], Y. WU[1], I. WONG[1], J. LIANG[2]
[1]TNEI Services Ltd United Kingdom; [2]Cardiff University United Kingdom

ID: 11823
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: DC Fault, Fault Isolation and Recovery, Full-Bridge MMC, Half-Bridge MMC, Overhead Line

Control and Recovery of DC Faults in Overhead Line UHVDC Systems: A Comparison of Full-Bridge and Half-Bridge MMCs

D. LIU[1], Q. HONG[1], L. XU[1], A. DYSKO[1], C. BOOTH[1], X. DING[2]
[1]University of Strathclyde United Kingdom; [2]National Grid United Kingdom

ID: 11851
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: O&M, HVDC Service, Reliability, Availability, Contracting, Costs, Knowledge Sharing

Transitional HVDC Systems Operation and Maintenance Strategy

J.-M. DUBOIS[1], R. MACNEILL[2]
[1]WSP; [2]Emera

ID: 11853
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC, Digital Twin, Digitalization, Grid Forming, Simulation, Modelling

HVDC Digital Twin – Maturity Level and Use Cases

J.-M. DUBOIS[1], H. SPAIN[2], A. BUREK[3], S. CHRISTOU[4]
[1]WSP; [2]Erigrid, Ireland; [3]Hitachi Energy, Sweden; [4]EDF Renewables, UK

ID: 11874
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Multi-purpose, multi-terminal HVDC interconnector for offshore wind, RAM study.

RAM Analysis of an HVDC Multi-purpose Interconnector for Offshore Wind Integration

M. MEISINGSET[1], I. VETVIK[1], G. EVENSET[1], C. E. HILLESUND[1], E. KJØSNES[2], Ø. SAGOSEN[2], J. RIVIERE[2], A. ELMENSHAWY[2], M. V. D. BERGE[3], S. AKKARI[3]
[1]Statnett; [2]Aker Solutions; [3]RTE International

ID: 11875
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Reliability – Availability – Nordic HVDC – LCC – VSC – Interconnectors

Analysis of reliability of Nordic HVDC interconnectors based on DISTAC data from 2016-2022

M. EIE[1], H. RØRVIK[1], O. HEADLEY[2], S. SØRENSEN[2], H. NURMINEN[3], P. LINDBLAD[3], D. INGEMANSSON[4], G.-O. PERSSON[4], P. PETERSSON[4]
[1]Statnett; [2]Energinet; [3]Fingrid; [4]Svenska Kraftnät

ID: 11979
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: STATCOM, Container, Modular

Introduction of Containerized STATCOM up to 200Mvar Rating

M. LEE
Hyosung Heavy Industries

ID: 12012
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Composite Insulators, HVDC, Air-Core Dry-Type Reactors, Electrical Stress, Creepage Distance

Operational Experience with Composite Insulators for HVDC Air Core Reactors in Outdoor Polluted Environments

A. GAUN[1], Y. SOLOVYEV[2], L. AREVALO[2], S. WIRTH[2], J. KATZENSTEINER[1]
[1]Coil Innovation GmbH; [2]Hitachi Energy

ID: 12031
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC transmission, DC networks, short-circuit current, standardisation.

Discussion of simplified methods for short-circuit current calculation in HVDC networks

J. HANSON[1], J. LEIDE[2], A. SIMAKU[4], A. SACIAK[3], T. FRIEß[5], G. BALZER[6]
[1]TU Darmstadt; [2]TU Darmstadt; [3]TU Darmstadt; [4]TU Darmstadt; [5]TU Darmstadt; [6]TU Darmstadt

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Commissioning, Control and Protection System, Converter Station Design, Expandability, HVDC

Key facilitators of HVDC systems for advanced electrical infrastructures

A.-S. BONDE MORTENSEN, V. HUSSENNETHER, T. HAMMER, C. SUSAI
Siemens Energy

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems

Commutation Failure Prediction in LCC-HVDC under Severe Voltage Distortion

C. SEO, H. LEE, J. CHA, G. JANG
Korea University

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: AC/DC interaction, AC filters, Compound resonance, EMT simulation, Low-order harmonics

Interaction of Low-order Harmonics between the Chilean weak-AC system and the HVDC Kimal-Lo Aguirre project

J. CALDERON
Conexion Kimal-Lo Aguirre

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: TRV, Weak AC system, Large Firing/Extinctions angles, DMR, Background harmonics

Relevant Challenges and Lessons Learned from the Kimal-Lo Aguirre HVDC Project in Chile

J. CALDERON, R. ARIAS
Conexion Kimal-Lo Aguirre

ID: 12079
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Dedicated Metallic Return, fault location, high-impedance fault, impedance method, real-time monitoring

Real-Time Fault Monitoring and Location in the Dedicated Metallic Return of the HVDC Kimal–Lo Aguirre System

M. FERNANDEZ, J. CALDERON, P. OLIVEIRA-SILVA
Conexion Kimal-Lo Aguirre

ID: 12289
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems

Keywords: high voltage direct current, HVDC, hybrid HVDC breaker, HHB, DC circuit breaker, DCCB, multi-terminal HVDC, MTDC, DC switching station, DCSS, DC grid controller, DCGC

A hybrid HVDC Breaker for 525 kV DC Switching Station Applications

D. COTTET[1], K. GAJJAR[2], V. K[2], A. SENGUPTA[2], J. LILJEKVIST[3], M. STOECKLI[4]
[1]Hitachi Energy Switzerland; [2]Hitachi Energy India; [3]Hitachi Energy Sweden; [4]ELECTROSUISSE / CIGRE Switzerland NC Secretary

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: digital substation, HVDC system, protection, DC current transformer, process bus architecture, IEC 61850

Digital Wideband DCCT with advanced Signal Processing and IEC 61850 Communication Services

M. WINKELNKEMPER[1], R. IBANEZ CATALA[2], C. KRIGER[3], A. M. NCUBE[4], M. STOECKLI[5]
[1]Pfiffner Instrument Transformer Switzerland; [2]ramDSP Spain; [3]Cape Peninsula University of Technology Rep. of South Africa; [4]CubeIO Rep. of South Africa; [5]ELECTROSUISSE / CIGRE Switzerland NC Secretary

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Topics: B4 PS1 - DC equipment and systems

Design Implications of DC Grounding in Bipolar VSC-HVDC Systems

M. MOHAMMADI, H. YING-JIANG, A.-K. SKYTT
Hitachi Energy

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems

Impact of DC Circuit Breakers on Transient Stresses within Modular Multilevel Converters in Bipolar HVDC Systems

M. KUHN[1], L. OSTERKAMP[1], W. LETERME[1], G. OGORODNIKS[2], M. QUESTER[2]
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Topics: B4 PS1 - DC equipment and systems

Towards Resilient HVDC Networks: DC Switching Stations and Multi-Vendor Interoperability

T. WESTERWELLER[1], X. LIE[2], N. VAN DER LAAG[1], R. MANOHAR[2], M. FOEHR[1], A. YU[3]
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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC – Condition Monitoring – Pilot installation – Wireless Sensor Networks – Cybersecurity

Piloting Wireless Communication-based Condition Monitoring in an HVDC Station

K. SCHOENLEBER[1], R. GORE[3], J. CASTELLANOS[1], B. DECK[2], A. FAIRBROTHER[2], H. ELHUSSINI[4], N. ENGLUND[3], J. JUNG[5], M. GRATZA[5]
[1]Hitachi Energy Research Germany; [2]Hitachi Energy Research Switzerland; [3]Hitachi Energy Research Sweden; [4]Hitachi Energy Canada; [5]TenneT Germany

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems

On Transient Electrical Cable Stresses in Next Generation Multiterminal HVDC Systems

M. GOERTZ[1], S. WENIG[1], P. PINTER[1], T. SCHAUPP[2], M. SANAEE[2], A. SACIAK[3], I. NETT[4], V. SCHNELL[4]
[1]Mosaic Grid Solutions GmbH; [2]TransnetBW GmbH; [3]50Hertz Transmission GmbH; [4]TenneT TSO GmbH

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems

Optimizing of VSC HVDC-Systems with the use of an On-Load Tap Changer Transformer

J. KAYSER[1], S. SCHLEGEL[1], D. WESTERMANN[1], M. BENGLER[2], S. REHKOPF[2]
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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers

Topics: B4 PS1 - DC equipment and systems
Keywords: HVDC - Dynamic phasor - Fourier transform - Switching function

Optimization of Dynamic Phasor Modeling for LCC-HVDC Systems Based on Fourier Transform

K. ZHANG[1], Y. XUE[2], P. LI[3], D. ZHANG[3], J. LEI[3], S. CHEN[3]
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ID: 12511
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: Bidirectional, DC system, DC circuit breaker, low-loss, self-charging

Low-loss Bidirectional DC Circuit Breaker with Capacitance Self-charging Ability

Y. TAO, S. LIU, Z. LIU, Y. GENG
Xi'an Jiaotong University

ID: 12512
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems
Keywords: DC current limiter, Three winding coupled inductance, Dynamic performance of DC system

A novel low-impedance bidirectional voltage-clamped fault current limiter based on a coupled inductor

Z. YUAN, S. LIU, J. CHEN, Z. LIU
Xi'an Jiaotong University

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS1 - DC equipment and systems

Assessment of Station & System Tests of the Attica - Crete HVDC Interconnection

M. KARYSTIANOS[1], P. MANDOULIDIS[1], Y. TSOURAKIS[1], G. FOTOPOULOS[1], A. GIOTIS[1], D. BROUSOVANAS[1], N. GINIS[1], E. BELIVANIS[1], K. ROGDAKIS[1], C. GEORGIOU[1], P. SIDERIS[1], N. KATSARAS[1], M. VOUMVOULAKI[1], C. KARATZAS[1], I. VENETIDIS[1], S. RIGA[1], C. APOSTOLOPOULOS[2], K. KAVOURIDIS[2], K. SPETSIOTIS[2], C. MOULOS[2], D. PEPPAS[2], I. NIKOLAKAKIS[2], I. KOLLIOPOULOS[2], D. KARAKATSANIS[2]
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B4 PS2 - FACTS and power electronics (PE)

ID: 10277
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS2 - FACTS and power electronics (PE)
Keywords: Multi-terminal DC, harmonic stability analysis, optimal power flow, open source

Advanced simulation framework for AC/MTDC power systems

A. LEKIĆ[1], A. KERMANSARAVI[2], H. LI[1], Y. Q. LARES[1], S. ALSARAYREH[1], R. DIMITROVSKI[3]
[1]Delft University of Technology; [2]The Hague University of Applied Sciences; [3]TenneT TSO GmbH

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Topics: B4 PS2 - FACTS and power electronics (PE)

Experience Of Statcom For Improvement Of Voltage Stability & Assistance In Avoiding Loss Of Generation Of Renewable Energy (Inverter Based Solar Power) In Western India

Y. CHOUDHARY*
PGCIL, INDIA

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Topics: B4 PS2 - FACTS and power electronics (PE)

Operational Experience of STATCOM in POWERGRID- challenges and mitigation

S. K. CHAURASIA*, K. SINGH*, P. SHARMA, Y K DIXIT
POWERGRID, INDIA

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Enhancing Grid Resilience of RE dominant Power System's through STATCOM's – A Practical Illustration

S. C S. M*

Power Grid Corporation of India Limited

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS2 - FACTS and power electronics (PE)
Keywords: coupling transformer, contingency study, grid stability, MMC-VSC, MSC, MSR, renewable, Reactive power control, STATCOM, VI curve, voltage control

Fatehagrh III STATCOM-Requirements and Practical challenges

R. K. NAYAK*, J. BENDI
Resonia Limited, INDIA

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Topics: B4 PS2 - FACTS and power electronics (PE)

Optimisation of MSR & MSC switching instances during Auto mode operation of STATCOM to enhance the life of the equipment

S. BEHARA*, N. KUMAR, C. M. RAO
POWERGRID, INDIA

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS2 - FACTS and power electronics (PE)
Keywords: Stabilizing Devices; Oscillation Damping; Active and Reactive Power Control

"Commissioning and Field Testing of 40 MW Stabilizing Devices in the Italian Transmission Grid"

P. VACANTE
TERNA

ID: 11106
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS2 - FACTS and power electronics (PE)
Keywords: STATCOM, Steinmetz Method, Railway Traction Systems, Voltage Unbalance, Negative-Sequence Voltage Mitigation, ATP-EMTP, Reactive Power Control

"Mitigation of Voltage Unbalances in Railway Traction Systems Connected to 150 kV Grids Through STATCOM-Based Reactive Power Control"

L. PAPI
TERNA

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS2 - FACTS and power electronics (PE)
Keywords: High Voltage Direct Current (HVDC) - Sub-Synchronous Torsional Interaction (SSTI) - Multi-Infeed Interaction Factor (MIIF)

Pre-FEED Study Approach in HVDC Projects with Perspective on Using Grid-Forming/Grid-Following Controls for Point-to-Point HVDCs

S. PARMAR[1], I. HUQ[2], O. AMAYA-ZEPEDA[3]
[1]Grid United, LLC, United States of America; [2]Siemens Energy, Germany; [3]Siemens Energy, Canada

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS2 - FACTS and power electronics (PE)
Keywords: STATCOM, Grid-forming

Synchronous Grid-forming STATCOM Supercapacitor Energy Storage - Control During Active-Power Involving Events

M. BERG, L. AMBEGODA, A. MÄKINEN, T. QORIA, O. JASIM, C. BARKER, S. ZANDRAZAVI
GE Vernova

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Topics: B4 PS2 - FACTS and power electronics (PE)

How FACTS plays a key role in the Grid of the Future

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS2 - FACTS and power electronics (PE)
Keywords: Power conversion system, Modeling, Grid-following, Grid-forming, Characteristics analysis

Grid-Connected Characteristics Analysis of GFL PCS and GFM PCS under Dynamics Perspective

X. GONG, M. CHEN, P. PENG, J. DOE
CSG PGC Energy Storage Research Institute

ID: 11601
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS2 - FACTS and power electronics (PE)
Keywords: High-frequency resonance, STATCOM, impedance reshaping, negative damping

Active Impedance Reshaping for High-frequency Resonance Suppression of Renewable Energy Power Stations with STATCOM

H. YU, C. WANG, X. WU, X. WEI, P. WANG
SIEYUAN ELECTRIC CO., LTD

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS2 - FACTS and power electronics (PE)
Keywords: 100%IBRs, Dual-layer Optimization Method, Levelized Cost of Energy, Time-Averaged Power Ratio, Net Present Value, Grid-forming Battery Energy Storage System

Control Strategies for Stable Operation and Optimal Capacity Configuration of 100% Inverter-Based Systems with GFM-BESS

L. ZHANG, X. MENG, L. HUANG, X. ZHANG
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Technical Evaluation and Practical Solutions for Grounding Grid Design Performance in FACTS Projects

B. ALSUHAIBANI, A. IBRAHIM
Saudi Electricity Company

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS2 - FACTS and power electronics (PE)
Keywords: Unified Power-Flow Controller (UPFC), Flexible Alternating Current Transmission Systems (FACTS), Genetic Algorithm (GA), System Stability, optimal allocation of the UPFC

Optimal Placement and Comparative Analysis of a High-Power Multi-Level Unified Power Flow Controller (UPFC) for Voltage Stability and Power Loss Reduction in the Power System Network

H. F. CARLAK[1], E. KAYAR[2]
[1]Akdeniz University; [2]Turkish Electricity Transmission Corporation

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Topics: B4 PS2 - FACTS and power electronics (PE)

Experiences and recommendations for parallel operation of SSSC devices, Candelaria – Ternera 220 kV circuits case

C. ACOSTA[1], W. MEJIA[2]
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ID: 12450
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS2 - FACTS and power electronics (PE)
Keywords: distribution grids, grid protection, high-frequency current injection, low-voltage grids, power- flow control, short-circuit, soft open points, universal power-flow and quality controller

Rapid tripping of a NH fuse using a power-flow controller with high-frequency current injection

A. KOEHLER, D. KESHAVARZI, N. TASHAKOR, W. H. WELLSSOW, S. M. GOETZ
University of Kaiserslautern- Landau Germany

ID: 12454
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS2 - FACTS and power electronics (PE)
Keywords: EMC filter design – EMC filter testing – low-voltage grids – power flow controller

Design and Testing of Filters to Reduce EMC Interference in a Power-Flow Controller Based on Power electronics

G. SHOBAIRIAN, A. KOEHLER, D. KESHAVARZI, S. M. GOETZ
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ID: 12513
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS2 - FACTS and power electronics (PE)
Keywords: Switching losses (SL), electromagnetic interference (EMI), the basic commutation unit, the equivalent waveform, NSGA-Ⅱ

Tradeoff for Power Loss and Electromagnetic Interference of IGBT Devices in Converter

B. HAO, J. XIONG, K. LIU, J. YANG, Y. WANG
CSG Guangdong Guangzhou Power Supply Bureau

ID: 12514
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS2 - FACTS and power electronics (PE)
Keywords: Harmonic current; active power filter; neural network; predictive control

Research on Neural Network Predictive Control Based Active Power Filter

J. LI, Y. HUANG, L. ZHAO
State Grid Changsha Power Supply Company

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS2 - FACTS and power electronics (PE)
Keywords: Modular Multilevel Converter, Nearest-level modulation, Small-signal stability, Frequency scanning

Impact of Nearest-Level Modulation harmonics on the Small- Signal Dynamics of the Modular Multilevel Converter

R. VANDEREECKT[1], J. TANT[2], J. BEERTEN[3]
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B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition

ID: 10104
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: HVDC - Large Renewable Generation Hubs - Grid-Forming

New Concepts in Overall Control of Large Renewable Generation Hubs Connected to Load Centers through Grid-Forming Multi-Terminal HVDC Technology

P. POURBEIK[1], A. NICHOLS[2], D. PIERSON[3], H. ABRAMS[4], R. MAJUMDER[2]
[1]PEACE, United State of America; [2]Invenergy, LLC, United States of America; [3]1898 and Co., United States of America; [4]Hitachi Energy, United States of America

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Power Oscillation, Modulation control, High level controls, LCC HVDC, VSC HVDC, sinusoidal PWM, Space Vector PWM

Application of Space Vector Pulse Width Modulation in VSC HVDC converter to damp inter-area oscillations in Active power in a part of Indian grid

P. MISHRA*, B. MAZUMDAR, P. TYAGI
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Concept of Integrated Reactive Power Management in a National Renewable Energy Hub

L. CHUNDAWAT*, S. MISHRA, S. JALUTHARIA
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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: HVDC, protection, multi-terminal, multi-vendor, interoperability

Protection-related functional requirements for multi-terminal, multi-vendor HVDC grids

D. GOMEZ, P. TORWELL, A. BERTINATO, K. SHINODA, S. SILVANT
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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Multi-terminal HVDC grids, Bipolar HVDC, Insulation coordination, DC circuit breakers.

Insulation Coordination in Bipolar Multi-Terminal HVDC Grids

B. DE FOUCAUD, J. POUGET, A. PETIT, P. RAULT, C. CARDOZO, S. DENNETIERE
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ID: 10793
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Superconducting Cables, MVDC, DC Circuit Breaker, Converter, Resistive Fault Current Limiter

Superconducting Medium Voltage DC Transmission: Architecture, Protection, and Simulation Insights

C. CREUSOT[1], A. BERTINATO[1], P.-B. STECKLER[1], D. BRASILIANO[1], N. DEVEAUX[1], A. MORANDI[2], E. GUERRA[2], M. SIMONAZZI[2], M. FABBRI[2], G. ANGELI[3], A. MUSSO[3], M. BOCCHI[3]
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ID: 10794
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Models, Replicas, Dynamic Link Library (DLL), Electromagnetic Transient (EMT) study, Integration tests.

Testing models and physical C&P replicas prior to interaction studies in a MV and MT context

A. BONNET[1], R. BAKHSHI-JAFARABADI[2], J. POUGET[1], F. DEHGHAN MARVASTI[2], B. DE FOUCAUD[1], A. SHETGAONKAR[2], H. CLEMOT[1], R. KAMAT TARCAR[2], A. PETIT[1], R. KOORNNEEF[2], C. MARTIN[1], A. LEKIĆ[2], S. DENNETIERE[1], M. POPOV[2]
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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: VSC HVDC - STATCOM - Grid-Forming Control (GFM) - Grid-following Control (GFL) - Control and Protection - Technical Specification - Performance Requirements - Dynamic Performance Studies (DPS) - Front End Engineering and Design (FEED)

An Owner's Perspective on the Implementation of Grid-Forming Controls for VSC HVDC and STATCOM Projects

C. WINTER[1], P. SCHOMMER[1], J. HU[2], J. MARSHIK[1], R. PALLAPATI[1], B. BISEWSKI[2]
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ID: 10876
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: HVDC Converter Stations - Autonomous Inspection Robots - Functional Speciications - Electromagnetic Compatibility (EMC) - Valve Hall Inspection - Substation Robotics - Asset Condition Monitoring - Energy Transition

Deployment Considerations of Autonomous Robots in HVDC Converter Stations

R. ADAPA, S. A. S. BELLARY
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ID: 10943
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Hardware in the Loop, Simulation, HVDC, System, Multivendor Interoperability, Multi Terminal

Development of guidelines and HIL simulation on the control and protection scheme for multivendor multi-terminal HVDC systems

M. KASUGA[1], T. YAMADA[2], Y. AKIYAMA[3], T. YOSHIHARA[4], S. TOMINAGA[5], T. NAKAJIMA[6]
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ID: 10944
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: DC Circuit Breaker (DC-CB), HVDC, MTDC, VARC, Switching Station, Energy, Absorption

Analysis of DC circuit breaker performance in multi-terminal HVDC grids considering fault dynamics and reclosing behaviour

R. MANOHAR[1], K. TAHATA[1], Y. TERADA[1], S. NEE[2], T. MODEER[2], L. XU[3]
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ID: 10945
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: DC Circuit Breaker (DC-CB), HVDC, Multi terminal

Operation of modular VARC DC-CB under load and fault current and the impact on system dynamics

F. PAGE[1], T. INAGAKI[1], K. TAHATA[1], S. NORRGA[2], T. MODEER[2], L. XU[3]

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ID: 11107
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: AC/DC conversion, Converter-Transformer, DC fault interruption, DC/DC conversion, Experimental validation, HVDC, MMC, Prototype testing, Scalable design, Solid-state protection

"Experimental Validation of a Low-Voltage Prototype of a Converter- Transformer for HVDC Applications"

M. AMATRUDA
TERNA

ID: 11109
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Meshed-HVDC; HVDC circuit breaker; voltage polarity reversals

Development of a Novel Polarity Reversal Inhibitor for Future MT-HVDC

P. VACANTE
TERNA

ID: 11267
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Multiterminal HVDC (MTDC), grid-forming, Brazilian power system, renewable energy integration, transmission planning, hybrid AC/DC grids

Assessment of Multiterminal HVDC Systems with Grid-Forming Converters in the Brazilian Power System

R. DIAS[1], P. M. PORTUGAL[1], M. C. SABOIA[1], P. H. L. d. SANTOS[1], M. A. AREDES[1], C. M. FREITAS[2]
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ID: 11281
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: GFM, Offshore Interconnections, SGFM, VSC-HVDC, Wind Farms, Phase-jump functionality.

Expanded Grid-Forming Solution and SGFM Control in HVDC System to Harvest Additional Energy from Offshore Wind Farms

O. JASIM[1], C. BARKER[1], T. QORIA[2]
[1]GE Vernova United Kingdom; [2]GE Vernova Germany

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Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Bipole, SGFM, DMR, Power Electronics Module, Offshore Interconnections, VSC-HVDC, Wind Farms.

TenneT 2GW Bipole Offshore HVDC Transmission Schemes – Key Advanced Control Features

O. JASIM[1], M. KUMAR[1], A. KUMAR[1], S. KABUL[2], A. DEY[3], Z. AHMED[4], R. WINSENBERG[5], B. KOX[4]
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ID: 11283
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Asymmetrical monopole, DC-PIR, MPI, Multi-terminal HVDC network, Rigid bipole.

HansaLink: Multiterminal HVDC Rigid Bipole Offshore MPI

M. ELGENEDY[1], A. KHAN[1], N. SHARMA[1], C. FOOTE[1], B. MARSHALL[1], G. FINTZOS[2], E. SPAHIC[3]
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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Converter design, dc-dc converter, grid infrastructure, LVDC, MVDC, railway load

Medium voltage railway dc-dc converter design and performance

M. S. ANSARI
Hitachi Energy

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition

Virtual Control and Protection System in Real Time Software in the Loop

J. HERNANDEZ
Hitachi Energy

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Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Reverse Blocking IGCT (RB-IGCT), Hybrid Commutated Converter (HCC), UHVDC, Commutation Failure

Key Technologies and Research Applications of UHVDC Current Source Converters Based on RB-IGCT

R. ZENG[3], X. WEI[1,2], Z. YU[3,1], G. TANG[1], H. RAO[4], Y. SHAN[1], S. LI[1], W. CAI[4], T. JIANG[1]
[1]Beijing Huairou Laboratory; [2]China Southern Power Grid Novel Electric Power System (BEIJING) Research Institute Co., Ltd; [3]Tsinghua University; [4]Electric Power Research Institute, CSG

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Offshore wind power, low-frequency AC transmission, multi-terminal LFAC systems, AC/AC converter, fault ride-through, modular multilevel converter

Low-Frequency AC Transmission for Offshore Wind Power: Key Technologies and Grid Integration Challenges

Y. LU, Z. LI, X. NI, P. QIU, C. DING, W. YE
State Grid Zhejiang Electric Power Research Institute

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: VSC-HVDC system, MMC, AC/DC fault ride-through, DECF-MMC, distributed energy consumption function

Feasibility Study on Cancelling the DC Choppers in VSC-HVDCs for Renewable Energy Integration

Y. ZHOU, W. CAO, Y. XU, Y. CHEN
Electric Power Research Institute CSG

ID: 11550
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: DCCB, DCSS, Multi-terminal HVDC

Performance Study and Specification Framework for DC Circuit Breakers in Multi-Terminal HVDC Networks

S. RANGASAMY[1], C. FOOTE[1], B. MARSHALL[1], A. KHAN[1], A. JANA[1], W. AHMAD[1], X. HUANG[1], H. BEKKOURI[2], S. S. H. YAZDI[3]
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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Digital Twin, HVDC Interconnector, Black Start, Network Restoration, Real-Time Simulation, Grid Forming, Adaptive Protection and Control.

Digital Twin-Enabled Support for Network Restoration: A Case Study on Grid-Forming Controlled HVDC Interconnectors

Y. LI[1], Y. FAN[2], C. WU[2], X.-P. ZHANG[2], N. CHEN[2], X. DING[3], R. ZHANG[4]
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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: AC-AC converter, Electrification, Modular Multilevel converter, Offshore system, Power from Shore, Static Frequency Converter.

Electrification of offshore platforms using Static Frequency Converters - Concept analysis for the Norwegian grid

A. DUQUE
Hitachi Energy

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Grid Forming STATCOM Dynamic Performance: A Technical Study

Y. KHAYAT
Hitachi Energy

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Grid forming inverter, DC dynamics, Synchronous machine, Current control, Fault ride-through capability

A Novel Grid-Forming Controller Based Upon DC-Side Dynamics

U. HETTIARACHCHI[1], S. FILIZADEH[1], T. THILEKHA[2]
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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Solid State Transformer, Data Centers, electromagnetic transient simulation (EMT), Real Time simulation

FPGA-Based Modelling of Modular Power Converters for Data Centres System Interconnection and Integration Studies

J. PAEZ ALVAREZ, S. K. ANCHA, L. J. LEWIS, M. HOSEINIZADEH
Opal-RT Technologies, Canada

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Multi-terminal DC (MTDC), high-voltage DC (HVDC), DC circuit breaker (DCCB), DC power flow controller (DCPFC), multiport, interline

An Interline Multiport DC Circuit Breaker with Power Flow Controller

Z. J. {. ZHANG[1], M. FERDOUS[1], Q. YANG[2], M. SAEEDIFARD[3]
[1]The University of British Columbia, Canada; [2]University of Central Florida, USA; [3]Georgia Institute of Technology, USA

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Comparative Analysis of AI-Based DVR Control Strategies for Hybrid Renewable Energy Systems: LSTM vs. PSO-Tuned Fuzzy Logic Controller

M. TBAISHAT, Y. MASHAGBEH
Samra Electric Power Co.

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: DC FRT, GFM, MTDC systems, DC protection, Partially selective protection, EMT studies

DC FRT Analysis and Disturbance Propagation of Grid-Forming HVDC Converters in Future MTDC Systems

J. CASTELLANOS[1], L. XU[2], F. PEREZ[3], A. ZAMA[3], A. BENCHAIB[3]
[1]SuperGrid Institute / University of Strathclyde UK; [2]University of Strathclyde UK; [3]SuperGrid Institute France

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Innovation and Challenges in the Implementation of Series FACTS in 500kV Transmission Lines of the Peruvian System

M. P. PASTRANA[1], A. C. CASTRO[2], A. H. HUACCHO[3], C. S. SANCHEZ[4], H. M. MANTILLA[5]
[1]ISA; [2]ISA; [3]ISA; [4]ISA; [5]ISA

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: solid-state transformer, economic analysis, MVDC

Economic Analysis of Solid-State Transformers for Modern Power Systems

T. GRADINGER[1], J. BENKE[5], E. GARCIA MARTINEZ[4], J. MUNOZ-CRUZADO ALBA[3], F. WALD[2], M. MOGOROVIC[1], M. STOECKLI[6]
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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: distribution grid, transformer, control, power quality, reactive power, PQ

Advanced Management and Power Quality Performance of Hybrid Transformers in modern Distribution Networks

M. MOGOROVIC[1], R. ALVES[2], A. Z. KHAN[3], L. PETRIANNI[4], M. BARTOLUCCI[4], S. GIOVANETTI[4], R. SANCHEZ[5], G. ANDREELLA[5], M. STOECKLI[6]
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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers

Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Congestion Management; Multi-terminal HVDC System; Protection Scheme

Modelling Protection Concepts for Multi-terminal HVDC Systems for Congestion Management

M. KRUEGER[1], C. GERDON[1], J. DILCHERT[1], M. KAHL[2], C. DETERS[2], A. MOSER[1]
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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: HVDC Circuit Breaker, High Voltage Direct Current, HVDC Grid, Multiterminal HVDC Systems, Power Electronics, High Performance

Ultra-fast Power Electronics based HVDC Circuit Breaker: A Paradigm Shift towards System Flexibility and advanced Control Features

S. SEMMLER[1], J. DORN[1], R. ALVAREZ[1], A. VAN SCHIJNDEL[2], D. SOUBRIER[3], W. KRUSCHEL[4], M. SANAEE[5]
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E-STATCOM, the first of its kind: Design and performance of a supercapacitor energy storage integrated into a STATCOM

F. PRÖBSTL[1], T. ENGELBRECHT[1], G. KUHN[2]
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ID: 12515
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: VSC-UHVDC, overvoltage, fault ride-through, converter valve

System Design for the World's First ±800 kV 8 GW VSC-UHVDC Transmission Project

Y. XU, Z. GAO, L. WANG, Y. ZHAO, T. LEI, Y. ZHANG, F. ZHANG
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ID: 12644
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New technologies and concepts of DC and FACTS enabling energy transition
Keywords: Power-electronic converter, power system stability, Nyquist criterion, power grids, renewable sources

Effect of Power Electronic Converter Parameters on Converter- driven Stability in Transmission Grids with High Converter- interfaced Device Penetration

J. LOKAR[1], B. BLAŽIČ[2], L. HERMAN[3]
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Training of Protection Engineers on the Impact of HVDC Converter Control Parameters on AC Distance Protection: a Practical Workshop

J. VERMUNICHT, R. LOENDERS, G. CHAFFEY, D. VAN HERTEM
KU Leuven/Etch EnergyVille, Belgium

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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Generative AI - Knowledge Management - Digital Substations

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A. APOSTOLOV
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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Knowledge Management, DSO, TSO, Skills, Asset Specificity, Asset Lifecyle, Survey, Legacy PAC, IEC 61850-based PAC, Discontinuity, Strategic Resources, IAM

How to preserve and develop PAC skills in a rapidly changing world

R. TROOST, S. VAN DER HEIJDEN, T. ALDERS
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Keywords: IEC 61850-9-2LE-Based, Bus, Demonstration, Testing

Development of an IEC 61850-9-2LE-Based Process Bus Demonstration, Testing and Training Environment

R. SUSANTO-LEE, N. NAGOORSAMY, D. LANGE, J. MENZIES, M. SURACE
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Keywords: Communication, Competencies, PAC Engineering

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S. SUDAKOV
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Keywords: ANALYSIS OF DISTANCE RELAY

Analysis of distance relay behavior during intercircuit faults – practical case study and theoretical analysis

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Keywords: 3T Framework: GETCO's Protection System

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Gujarat Energy Transmission Co. Ltd. INDIA

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Unlocking the Diagnostic Potential of Digital Relays for Protection Mis operation Analysis and Knowledge Management in the Indian Grid

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POWERGRID INDIA

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Keywords: Mis-operation of PLCC

Case studies and lesson learnt on Mis-operation of Power Line Carrier Communication (PLCC) & Digital Protection Coupler (DTPC) in EHV transmission lines.

J. KUMAR*, G. S*, A. VAISH, R. WADYALKAR
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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: STRATEGIC KNOWLEDGE MANAGEMENT FRAMEWORK PACM

Strategic knowledge management framework for pacm systems in indian power utilities: enabling a future-ready grid

S. K. MISHRA *, N. K. SINGH, A. TIWARY, J. PANI
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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Protection System Experiences. Case Studies

Protection System Experiences. Case Studies, Analysis and Learnings in Project Commissioning and O&M.

S. RAVAL*, N. RAJ
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Tool for SAS Configuration Error

Automated Tool for SAS Configuration Error Detection

A. CHOUDHARY*, V. C REDDY, A. NAYAN, S. K. SINGH, M. KUMAR, M T. REDDY
Power Grid Corporation of India Limited India

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Auto-Recloser Simulator Kit Enhanced Grid Reliability

Development and Implementation of Auto-Recloser Simulator Kit for Enhanced Grid Reliability and Offline Relay Testing

M. M. ALAM*, J. AHAMAD, V. P. SRIVASTAVA, P. KUMAR
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Education - Knowledge Management - Knowledge Transfer - Post-graduate - Undergraduate - Quality Assessment - Training - Workforce Demographic - Workforce Profiles

Impact of Evolving Knowledge on Professional Development of Protection, Automation, and Control Engineers

M. KEZUNOVIC
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Product Lifecycle Management (PLM), Model-Based Systems Engineering (MBSE), Common Requirement Modeling Language (CRML), Protection Automation and Control Systems (PACS), IEC 61850

Product Lifecycle Management applied to Substation Automation System specification documentation and visualization tool

E. YANG, J. CANTENOT, C. EFFANTIN, A. JARDIN, A. PAM, T. COSTE
EDF

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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Training, integrated approach, technological changes, systemic changes

Transforming Skills and Training at RTE in the Face of Energy Transition

M. DARRIGRAND, S. CHARTOIRE, N. APPLETON
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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Sustainable Design - Protection Philosophy - Knowledge Transfer

Knowledge Transfer through Sustainable Design

R. HUNT, E. UDREN
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Training - Education - Protective Relaying - Proprietary Point-to-Point Digital Secondary Systems - Artificial Intelligence

In-house Training Development for Relay and Protection Engineers

K. MALPEDE, A. FISHBECK, R. CARRERA, A. FRANKS

Commonwealth Edison, United States of America

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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Digital Substation, Gateway, Intelligent Electronic Devices (IEDs), IEC 61850, SCADA

Development of a Portable SCADA System for Substations complying with International Standards and Logical Node Assignment Organization

D. JOZEN, S. NISHI, K. NIKI, Y. NAGATANI, Y. TAKESHITA, A. OKAHISA
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: IED, International standard, Logical node, Proxy/gateway, Substation

Development and Management of IEC 61850-based Common Functional Specifications for Telecontrol Systems in Japan

K. RYONO[1], H. YAMASHITA[1], T. OTANI[1], T. MIZUKAMI[2], T. OGIYAMA[3], M. ONO[4]
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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Digital Substation, IEC61850, System Construction

Regarding the Management of Knowledge and Skills Required for the Construction of Digital Substations in Transmission and Distribution Companies

Y. TAKEUCHI, Y. SANO, T. OHMORI, Y. ICHIKAWA, M. SHINOZAKI
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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Certification Programs, Lifelong Learning, Knowledge management, Operational Technology, Virtualization & Testbeds.

Enhancing knowledge management and skills retention in OT protection and control environments

R. LEHUTSO, K. MANYAPETSA
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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Education, IEC 61850, Intent-Based Networking, Network Engineering, Time Synchronization

A Syllabus for Network Engineering in IEC 61850-Based PACS Systems

G. LISBOA, G. NORMANTON, J. R. CASTRO, A. VASQUEZ
Belden Brazil

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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: PACS, university, industry, training

Challenges in Developing a Training Program through a University–Industry Partnership for Preparing Recent Graduates to Work in the Field of PACS

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Digital Twin, Engineering Education, Knowledge Management, PAC Systems, Training

A Pedagogical Framework Proposal for Next-Generation Power System Protection Education: A Case Study on Digital Twin integration at the Federal University of Itajubá in Brazil

G. C. SANZ PIRES[1], C. A. VILLEGAS GUERRERO[2], F. O. PASSOS[2], P. M. SILVEIRA[2]
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Updating Engineering Teaching Through Active Learning: Applying Flipped Classroom in Under-Graduation

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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring

From Documents to Knowledge: Object-Oriented, Data-Centric Approaches Transforming Knowledge Management for PAC Systems

R. FERNANDES, J. MAGALHÃES, A. FARIA, P. ANDRADE, A. BELO
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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: protection, automation, communication, control, knowledge, management, reliability, training, digitalization, PAC systems

The Challenges Faced and the Potential Solutions at the Knowledge Management in Protection Automation and Control Systems in Brazil

J. B. MOTA JUNIOR[1], J. C. M. d. LIMA[2], D. B. d. OLIVEIRA[3], T. M. T. d. S. ALVES[3], J. R. PESENTE[4]
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Disturbance analysis, Fault location, IED testing, Short circuit, Team formation

The Importance of Knowledge in Disturbance Analysis and Fault Location Techniques for the Development of Protection Teams

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: PAC systems, IEC 61850, Full Digital Substation, knowledge, management, training

Team Qualification Strategies in the Digital Substations Scenario at Eletrobras

P. H FLORES, M. H. WANDERLEY
Eletrobras Brazil

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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: continuous professional development, multidisciplinary skill sets, PACS training customization.

Knowledge management and training approaches for PACS in the era of the energy and digital transition: Terna's experience

E. CASALE
TERNA

ID: 11180
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: PLC teleprotection devices, DSP, modernization, personnel training, digital twin, immunity to interference

Digital Twin of PLC Teleprotection Devices as a Modern Technology for their Modernization and Personnel Training

S. KIREEV[1], A. CHIRKOV[1], Y. CHIRKOV[1], A. CHIRKOVA[1], D. YASKO[2]
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Digital Substation, IEC 61850, Power Engineering Education, Engineering Training, Workforce Development, Practice Oriented Learning, Online Education

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A. ANOSHIN, A. GOLOVIN, N. MARARAKINA

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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: knowledge management, professional knowledge and skills, research and development, protection relay, synchronized phasor measurements, digital current and voltage instrument transformers

Applying Knowledge Management to Accelerate the Development of Protection, Automation, Measurement, and Monitoring Devices

D. ULYANOV[1], A. MOKEEV[2], P. SEITOV[1], S. PISKUNOV[2]
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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Operational personnel, Dispatch personnel, Three-stage training program, Theoretical base, Theoretical tasks, Practical exercises

Training Program for Operational and Dispatching Personnel of a Grid Company in the Field of Relay Protection and Automation

M. BELOVA
PJSC “ROSSETI" Leningradskoye PMES Branch

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Electric power industry, operational dispatch control, higher education, professional retraining programs in the electric power industry

Staffing of the Electric Power Industry: Model of Cooperation between Universities and JSC «System Operator of the United Power System» in the Field of Young Professionals Training

Y. KUTUMOV, A. OSTANIN, A. RASSHCHEPLYAEV, E. SATSUK
«SO UPS», JSC

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: relay protection and automation, advanced training, relay protection and automation specialists

Professional Development of Relay Protection and Automation Specialists at JSC «SO UPS»

A. RASSHCHEPLYAEV, A. KOZYREV, E. SATSUK
«SO UPS», JSC

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: IEC 61850; Digital Substation; Substation Monitoring; GOOSE; SCD

Preserving and Transferring Expertise through IEC 61850 Digital Substation Monitoring Tools

C. ALBERO[1], Y. GALVE[1], M. GUTIÉRREZ[1], E. VILLAREAL[2], J. MARTÍN[3]
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Event classification, transmission system, inrush currents, fault detection, PMU data

Data-Driven Algorithm for Disturbance Classification in Transmission Systems: Design, Implementation, and Experimental Evaluation

A. MEMIĆ, M. MUFTIĆ DEDOVIĆ, N. DAUTBAŠIĆ, A. MUJEZINOVIĆ, A. ALIHODŽIĆ, Z. BAJRAMOVIĆ
University of Sarajevo - Faculty of Electrical Engineering, Bosnia and Herzegovina

ID: 11778
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: IEC 61850-9-2, IEC 61869-9, Process Bus, Sampled Values.

ITAIPU Digital Substation Innovation Laboratory for Testing, Validation, and Education

G. MERELES[1], C. VILLASANTI[2], A. ORTIZ[3], P. LINDSTROM[4], D. GAMARRA[5]
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Merging unit, Peripheral Interface Unit, Digital substation, Process bus, IEC 61850, P&C in MU/PIU

The Hidden Regression: Risks of Embedding Protection and Control Functions in IEC 61850 Merging Units

C.-P. TEOH[1], J. WRIGHT[1], P. BRUN[2], H. HOANG[3], D.-T. VO[3]
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B5 PROTECTION AND AUTOMATION - Full Papers
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Expertise Development in Innovative Technologies for Next-Generation Substations

E. WEJANDER
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: OT Asset Transparency, Substation Automation, Cybersecurity, Asset Management, Knowledge Management, Digitalization, Patch Management, Vulnerability Management

Extending classic substation automation and control solutions modularly with substation management applications is key to ensure reliable operation, fast expansions and targeted investments

C. SPITZ, M. SCHACHINGER, N. FUCHS, M. BÖHM
Siemens AG

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: IEC 61850, IEC 61499, Power Utility Automation, Open-Source Tools, Education

Experiences with IEC 61850/61499 in Distributed Energy Resources and Substations Automation: A Standards-Driven, Open-Source Approach

T. I. STRASSER[1,2], F. PRÖSTL ANDRÈN[1]
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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring

Efficient Transformation: Innovative Strategy for the Modernization of Busbusbar differential Protections in Critical Substations

C. FERREIRA
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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Experience, Knowledge management, Protection, Training, Transmission system

Experience in Knowledge Management and Training of Power System Protection for New Employees in Thailand's Power Utility

A. LADLOI, S. CHAIPUNHA, B. KONGKAEO
Electricity Generating Authority of Thailand (EGAT)

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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring

Expert Systems for Automated Relay Setting and Coordination in Transmission Lines and Power Transformers.

G. GUTIERREZ[1], C. MENDEZ[2]
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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring

Support tool for establishing the technical analysis methodology for protection relay certification testing over time.

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring

From Field Experience to Knowledge Transfer: Enhancing Training in Line Differential Protection

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Cable insulation degradation, progressive faults, fault modelling, intermittent fault, fault early warning, distribution system

Broadband fault perception and knowledge automatic mining technology for power cables in new distribution system

B. WANG, Y. SHENG, Y. LIAO, X. DONG
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Smart grid technology, Knowledge transfer, Synergy of sectors, Pedagogical methodologies, Learning by doing, Simulation-based training, Test scenarios, Performance metrics, Educational modules, Practical competencies, Real-time applications, Process Bus t

Model of the practical knowledge collection and transfer on Smart Grid technologies through collaboration between the academic, industrial, and utility sectors in the Republic of Serbia

T. DAMLJANOVIĆ[1], M. JOVIČIĆ[1], M. ISAILOVIĆ[1], D. TRIJIĆ[2], V. MILANOVIĆ[2], M. PEJČEV[2], Z. STOJANOVIĆ[3], V. CVEJIĆ[4]
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Next Gen Resource Management: Empowering Organizational Agility and Innovation through Workforce Capability Development

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Challenges in training for PAC professionals - And how to overcome these

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Integrated engineering environment for consistent documentation, scalable knowledge transfer, and accelerated PAC project delivery

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: IEC61850, Automation, Vendor-agnostic, Guided-engineering, Open-source, OpenSCD

Enhancing IEC61850 Substation Engineering: The OpenSCD guided Engineering Wizard

R. DASTPAK[1], C. RUOPP[1], I. KRYBUS[2], S. BAUMGARTNER[2]
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Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring

Leveraging Digital Twins and AI Chatbots for Knowledge Management and Workforce Development

C. HARISPURU, M. KONDUZ
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B5 PROTECTION AND AUTOMATION - Full Papers

Topics: B5 PS1 - Knowledge management in the field of protection, automation, control, metering and monitoring
Keywords: Digital substation, IEC 61850, Precision Time Protocol, Time synchronization, End to end, Peer to peer, Redundancy, Network latency

Challenges of Implementing the Precision Time Protocol in Digital Substations

J. TOHOLJ[1], K. ĐURIĆ[2]
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B5 PS2 - Protection and control in networks with unconventional sources

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Topics: B5 PS2 - Protection and control in networks with unconventional sources

Evaluating Grid-Following and Grid-Forming MMC Impact on AC Fault Current Injection and Distance Protection

X. LIU[1], G. CHAFFEY[1], P. JUDGE[2], D. VAN HERTEM[1]
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A Resilient Protection Scheme for Active Distribution with Renewables

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Virtual Substation - Adaptive Protection - Solar Generation - Voltage Protection - IEC 61850

From Digital to Virtual: Adaptive Voltage Protection for Solar Generation Through Virtual Substation Architecture

J. ANDERSON
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Inverter-Based Resources (IBR) - Negative Sequence Current - Directional Polarization - Distance Protection - IEEE Std 2800 - Misoperations - Failure to Trip

Mitigating Directional Protection Challenges in Transmission Systems with Inverter-Based Resources: Modeling Negative Sequence Current Injection in Compliance with IEEE Std 2800-2022

C. CULPEPPER[1], Y. ALKRAIMEEN[1], M. R. RIVERA[3], S. GUPTA[2]
[1]Siemens Industry, Inc., United States of America; [2]Siemens AG, Germany; [3]Southern Company, United States of America

ID: 10226
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: IEC 61850 - Routable GOOSE (R-GOOSE) - Unconventional Sources - Protection

R-GOOSE and its Impact on Meeting the Performance Requirements for Protection and Control in Networks Dominated by Unconventional Sources

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ID: 10295
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: HYBRID MEASUREMENT, IEC 61850, HSR, PRP, DIGITAL SUBSTATION, TIME SYNCHRONISATION

Hybrid measurement solutions in digital substations

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ID: 10392
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: EMT, Simulation, Distance

Using EMT Simulation in Reviewing Distance Protection with Inverter Based Resources

N. NAGOORSAMY[1], M. SURACE[1], M. MARQUEZ[1], V. PILLAY[2]

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ID: 10395
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: 100 MW BESS, 220 kV, Australian grid

A case study on the integration of a 100 MW BESS into a 220 kV Australian grid using conventional Protection and Control schemes

R. BHARAT
CitiPower & Powercor, Australia

ID: 10448
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Neutral, Grounding, Reactor, arc, protection, transmission line

Importance of Neutral Grounding Reactor size in secondary arc extinction and its protection challenges in over compensated transmission line

A. PRAKASH*, P. JAIN, S. GHOSH, S. GHOSAL, M. R CHAND, P. MEENA, V. PANDEY, S USHA
Grid-India, India

ID: 10601
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Impact of Zero-Sequence Impedance errors

Impact of Zero-Sequence Impedance errors on ground fault detection and line parameter estimation using phasor measurements

M P. KUMAR*, A H. V. KUMAR, D. REDDY
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ID: 10626
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Presence of DFIG- Wind Integration ETAP

Analysis of Distance Relay Performance in the Presence of DFIG-based Wind Integration using ETAP

V. K. LAWYEE*[1], L. K. TANEJA[1], D. SINGH[2], A. AGGARWAL[1]
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: SCADA-Compatible (NPDFD)

SCADA-Compatible Normalized Power Deviation Fault Detection (NPDFD) for Unequal-Rated PV Strings with Irradiance-Based Transient Filtering

J. J.*, J. S. M., A. K. M, P. S. P, S. L, K. N. K.P
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ID: 10628
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Distance Protection for Networks Connected with Inverter Based Unconventional Sources

A New Time Domain Based Distance Protection for Networks Connected with Inverter Based Unconventional Sources

O. NAIDU*, N. GEORGE, M. KRAKOWSKI
Hitachi Energy Research India

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Renewable Energy Integration and Protection

Renewable Energy Integration and Protection : Insights and Solutions from the Southern Regional Grid of India

A. S. RONES V*, C J NIKHITHA, M K RAMESH, V BALAJI
SRLDC GRID -INDIA INDIA

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B5 PROTECTION AND AUTOMATION - Full Papers

Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Protection Challenges Bulk Penetration Unconventional Sources -

Protection Challenges Under Bulk Penetration of Unconventional Sources - Detailed Study, Analysis and Implementation of Upgradation in Protection Philosophy to Suit New Power System Dynamics

N. SHETH*
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Intelligent Fault Classification Solution

Intelligent Fault Classification Solution for Networks Connected with Unconventional Sources

O. NAIDU*, K. LIKHITHA, A. V, M. KRAKOWSKI
Hitachi Energy India

ID: 10632
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Lessons learned and field experience with protection

Challenges, Operational experience and key learnings of Protection and Control of networks, integrating renewable generation sources with large grid

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Adani Green Energy Ltd. INDIA

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Fault Localisation in Tree-Topology Wind Farm

Smart Fault Localisation in Tree-Topology Wind Farm Networks Using FPI and Machine Learning.

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ID: 10636
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Performance Assessment of Single Ended Fault Locator f

Performance Assessment of Single Ended Fault Locator for Lines Connected with Inverter Based Renewable Resources: Problems and Practical Solutions

O. NAIDU*, A v. SAI, S. KARMAKAR*
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ID: 10638
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: reverse blocking protection scheme Solar

Integration of reverse blocking protection scheme with SCADA systems in solar power installations

C. PARAG*, K. SUBIR
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Adaptive Protection and Auto-Reclosure in Indian Power Networks

Operational Experience with Adaptive Protection and Auto-Reclosure in Indian Power Networks with High Renewable Penetration

A. SHARMA*, A. DUBEY, S. K. SINGH
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: RE Integration in India- Challenges

Protection Challenges in Renewable Energy Integrated Networks: Indian Experience and Solutions

A. K. RAI*, K. K. SARKAR, V. BAGADIA, D. N. ROZEKAR
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Distance Protection for Transmission Lines

Assessment of Distance Protection for Transmission Lines Connected with Type III Wind FarmsConnected with Type III Wind Farms

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ID: 10643
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Protection of Export Cables Connecting Off-shore Wind Farms

Protection of Export Cables Connecting Off-shore Wind Farms to the Grid using Model-based State Estimation

V. PRADHAN*, O. NAIDU, V. S. ATS
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ID: 10644
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Advanced Protection and Controls for RE Power Networks:

Advanced Protection and Control Stratégies for Renewable-Rich Power Networks: Insights from DIGSILENT Simulations and Case Studies

A. K. MAJUMDAR*, D. S. YADAV, K. V. SINGH, P. SHARMA
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ID: 10683
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Digital Twin - Relay Protection - Closed Loop Co-Simulation - IEC 61850 - Inverter-Based Networks - Renewable Integration

Digital Twin in Relay Protection for Converter-Based Networks: From Foundational Vision to Closed Loop Co-Simulation and Lifecycle Integration

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Hardware-in-the-Loop (HIL) - Inverter-Based Resources (IBR) - Machine Learning (ML) - Line Protection - Three-Terminal Line - IEC 61850 GOOSE

Hardware-in-Loop Validation of a Machine Learning Algorithm with IEC 61850 GOOSE Communication to Protect a Three-Terminal Transmission Line Integrated with Inverter-Based Resources

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: GAN - Transmission Line Faults - Probabilistic Forecasting - Deep Learning - PMU Monitoring - Inverter-Based Resources - System Stability - Data Augmentation

Real-Time Fault Risk Forecasting on Transmission Lines Using Hybrid Deep-Learning Models and Generative Data Augmentation

S. S. MANN, D. OSORIO-GARCIA, H. S. POTTER
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ID: 10845
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Distance Relay, Inverter-Based Resources, Wind Power Plant, Power Transmission Line

Wind Power Plant Impacts on Distance Protections-Real Time Relays Testing

M.-S. DIALLO[2], D. ROBLEZ[2], C. GHAFARI[1], C. GUIBOUT[1], C. BOUDINET[2], B. RAISON[2], R. CAIRE[2]
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B5 PROTECTION AND AUTOMATION - Full Papers

Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Inverter - Grid-Forming - Transmission System - Protection - Fault Ride-Through - Hardware-in-the-Loop

Protection of Inverter-Dominated Transmission Systems: First Experiences from Hawaii Island

U. MUENZ[1], S. BHELA[1], A. BANERJEE[1], S. ELPELT[1], A. STINSKIY[1], S. DAS[2], A. HADDADI[2], E. FARANTATOS[2], D. KELLY[3], M. RENO[3], Z. DONG[4], A. ASHOK[4]
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ID: 10866
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Distance Protection - Directional Protection - Grid-Forming - IBR - IEEE 2800-2022

Impact of IEEE 2800-2022 Fault-Ride Through Requirements on the Protection of Network Dominated by IBRs

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ID: 10931
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Multiterminal Direct Current Transmission System - Fault Detection - Transmission Line - Ensemble Learning

A Hybrid Protection Method for DC Line Faults in MTDC Grids Based on Ensemble Learning Algorithm

Y. NIE[1], Q. YANG[2], Z. J. ZHANG[3], Q. XIA[4], S. DEBNATH[4], M. SAEEDIFARD[1]
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ID: 10949
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: R-GOOSE, R-SV, IEC 62351, Grid-Forming, PKI, KDC

Unconventional Interfaces for Protection, Measurement and Control of Unconventional Sources

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ID: 11032
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Communication-assisted protection, EMT simulations, inverter-dominated grids, inverter-based resources, line protection, MMC-HVDC, offshore wind farms

Protecting Collector Lines of MMC-HVDC-Connected Offshore Wind Farms: Insights on Communication-Assisted Schemes for Inverter-Dominated Grids

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ID: 11033
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Distance Protection, Overreach Zones, Inverter-Based Resources, Power System Protection, Impedance Nonlinearity, Protection Selectivity, Renewable Integration

Analysis of Criteria for Overreaching Zone Settings in Distance Protection for Dense Systems with High Penetration of Inverter-Based Resources

R. DUTRA[1], R. FERNANDES[2], J. M. ORDACGI F[1]
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ID: 11035
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: IBR transient behaviour, IEEE 2800-2022, inverter-based resources, phasor-based protection, transient-based protection, transmission line

Lessons Learned About Transient Behaviours of Inverter-Based Resources and Identification of Best Practices for Interconnection Line Protections

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B5 PROTECTION AND AUTOMATION - Full Papers

Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Adaptive Protection, DER, Distributed Generation, Relay Coordination, smart grids, renewable energy sources

Methodology for a Dynamic Adaptive Protection System in a Distribution Smart Grid with Penetration of Distributed Generators (DG)

W. S. HOKAMA[1], D. P. BERNARDON[2], A. HIGA[1], A. P. D. MORAIS[2]
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ID: 11040
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Inverter-Based Resources, Protection, Traveling Waves, Blackout

Impacts of IBRs on Conventional Protection Functions and Emerging Alternatives

P. S. P. JUNIOR, R. C. BERNARDINO, G. S. SALGE, C. M. MARTINS, P. S. PEREIRA, G. E. LOURENÇO
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Inverter-Based Resources, Grid-Code, Regulatory Process, GFL, GFM, Disturbance, Protection and Control Systems

Technical Aspects of Protection and Control Systems for Inverter-Based Resources in Compliance with Grid Codes and Regulatory Frameworks

R. FERNANDES[1], G. SILVA[2], R. DUTRA[3]
[1]Equans Brazil; [2]Auren Energia Brazil; [3]Consultant Brazil

ID: 11045
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: PAC systems, Renewable sources, inverters, knowledge

Impact of the Penetration of Renewable Energy Sources with Inverters in the Electrical Power System

D. B. OLIVEIRA[1], T. M. T. S. ALVES[1], J. C. d. LIMA[2], P. H. FLORES[3]
[1]ONS Brazil; [2]PUC University Brazil; [3]ELETROBRAS Brazil

ID: 11097
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: adaptive protection, CPC, DER, digital substation, directional overcurrent, HIL, IEC 61850, real-time validation, virtualization

Validation of adaptive protection framework in virtualized centralized protection architectures using Hardware-in-the-Loop methodology

E. ALVES[1], C. REIZ[1], A. MELIM[1], T. HEKKERT[1], A. CARRAPATOSO[1], C. GOUVEIA[1], A. ALEIXO[2], R. JORGE[2], J. PERES[2]
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ID: 11111
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Advanced Monitoring System; Black Start; Oscillation detection; Situational Awareness

Enhanced Monitoring System for Black Start Tests Using High Frequency Data Acquisition and Processing to Real Case in the Italian Transmission System

S. CASULLI
TERNA

ID: 11112
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Inverter-Based Resources (IBRs), photovoltaic systems, protection systems, simulation-based fault analysis, adaptive protection

Analyzing protection system performance in networks with high PV penetration: insights from simulation-based fault studies

S. GRILLO
POLITECNICO MILANO

ID: 11183
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Protection, Invertor, Wind Power Station, Solar Power Station, Transmission Line, Double Fed Induction Generator, Permanent Magnet Synchronous Generator

The Results of the Study on Relay Protection of Power Transmission Lines from Wind and Solar Power Plants

A. KOZYREV[2], A. RASSHCHEPLYAEV[2], A. VOLOSHIN[1], D. SEROV[1], R. MAXIMOV[1], O. DOBRIAGINA[1], D. ROMANOV[1], I. POLYGALIN[1]
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Short-Circuit, Protection, Relay-Automation, Inverter, Wind Turbine, Photovoltaic, Transient, Renewable-Energy

Analysis of Inverter Generators Behavior during Faults on Protected Elements

A. KOZYREV[2], A. RASSHCHEPLYAEV[2], A. VOLOSHIN[1], D. SEROV[1], R. MAXIMOV[1], O. DOBRIAGINA[1], D. ROMANOV[1], I. POLYGALIN[1]
[1]NRU "MPEI"; [2]"SO UPS", JSC

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources

Impact of increased renewable integration on power swing detection: a case study from the Portuguese DSO

L. NUNES[1], F. MENDES[1], J. SILVA[1], M. SILVA[1], A. LEIRIA[1], A. NEVES[2], J. GOMES[2], M. LOURO[2]
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ID: 11186
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: fault location, fault indicators, travelling wave method, overhead-cable lines, fault oscillograms

Application of Traveling-Wave Fault Location in Networks with Complex Topology and Distributed Generation

A. KUCHERIAVENKOV, A. FEOKTISTOV
Antraks

ID: 11190
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Control System, Modelling, PMU, Excitation Regulation, Static Stability, Identification, DPartition, Renewable Energy Sources, Adaptive Algorithm

Automatic Adjustment of AVR Settings Based on PMU Data in Power Grids with RES

E. SATSUK[1], D. DUBININ[1], T. KLIMOVA[2], J. IVANOV[2], A. DMITRIEVA[2], M. POROZKOV[2]
[1]«SO UPS», JSC; [2]LLC «RC «Prosoft-Systems»

ID: 11192
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Relay protection and automation algorithms, protections with absolute and relative selectivity, renewable energy sources, inverter converters, relay protection information parameters, symmetrical and fault components

Relay Protection Algorithms for Facilities with Renewable Energy Sources

V. EFREMOV[1], A. EFREMOV[1], M. PETRUSHKOV[1], S. SMIRNOV[2]
[1]«Relematika», LLC; [2]JSC «VNIIR»

ID: 11255
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Power Supply Restoration, Renewable Energy Sources (RES), Dynamic Programming, Graph Theory, Fault Location, Network Reconfiguration, Power System Resilience, Optimization Algorithm, Automated Control

Automatic Dynamic Graph Calculation for the Fault Location System in a Grid with a Large Number of Unreliable Renewable Energy Sources

A. VOLOSHIN[1], A. KUCHERIAVENKOV[2]
[1]NRU MPEI; [2]ANTRAKS

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources

Digital substation-roadmap for practical implementation

M. LOUKKALAHTI[1], K. MAJER[2], J. VALTARI[2]
[1]Helen Electricity Network Ltd; [2]ABB

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources

Modelling, Simulation, and Validation Tests for Sub-harmonics Protection Relay

B. POURNAZARIAN[1], K. TROFAST[1], J. KOPPINEN[1], T. RISSANEN[2], R. KORHONEN[2], J. M. GOMEZ[3]
[1]Ampner Oy; [2]Fingrid Oyj; [3]ERLPhase power technologies ltd

ID: 11467
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Hierarchical protection; backup protection; renewable energy; secondary system anomaly

A Novel Hierarchical Protection System for Power Grids with High Penetration of Renewable Energy Integration

B. LI[1], Q. TIAN[1], X. SHI[1], J. LIU[2], M. WEN[3], Y. QIU[4]
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ID: 11468
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: New energy sources; Distance protection; internal electromotive force estimation; Positive-sequence voltage; Distance Protection Optimization Scheme

Optimized Distance Protection Scheme for AC Transmission Lines Based on Phase Angle Difference of New Energy Equivalent Source

S. LIN, W. YU, H. LING, X. GAO
CYG SUNRI

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources

Behaviour of distance protection during off-nominal frequencies in the presence of inverter-based generation

R. CIMADEVILLA, A. CASTAÑÓN
ZIV, Spain

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Topics: B5 PS2 - Protection and control in networks with unconventional sources

Deep Learning-Based Faulted-Phase Selector for Transmission Networks with High Renewable Penetration Level

G. RIOS GÓMEZ, M. T. VILLEN MARTÍNEZ, A. A. PRADA HURTADO, E. MARTÍNEZ CARRASCO
CIRCE Technology Center, Spain

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Topics: B5 PS2 - Protection and control in networks with unconventional sources

Considerations on AC transmission distance protection in systems with high penetration of grid-forming inverter-based resources

A. FRETWELL[1], M. RASUL[1], D. PATYNOWSKI[2], K. ELSHAMY[2]
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources

HVDC Transmission Relaying Strategies: Advanced Protection Schemes for Converter Transformer / DC pole zone

M. MUSA, Y. ALGHALI, A. ALFAIFI, H. AL AMRI
Saudi Electricity Company

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Topics: B5 PS2 - Protection and control in networks with unconventional sources

Innovative Protection Strategies for Extensive Battery Storage integrated with AC Power Grid system

M. MUSA, K. AHMED, M. ALMOTAWA, H. AL AMRI
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Contingency, IEC 61850 protocol, IEC 61870-104 protocol, load shedding, PLC, SCADA.

Closed-Loop Analysis of WAMPAC Solutions in South Australian Power Grid Using Transient Time-domain Simulation

P. SHAH[1], M. A. KHAN[1], S. NORRIS[1], A. GLATZ[1], D. WILSON[1], M. GOLSHANI[1], D. PERERA[2], H. KLINGENBERG[2]

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources

Advancements for line differential protection using model-based approach

A. TSYLIN[1], Z. GAJIC[2], A. G. MOSER[1], S. AGANOVIC[2], R. PAJUNEN[2]
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ID: 11839
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Renewable Energy, Inverter Based Resource, Power System Protection, Distance Protection, Unconventional source.

Distance Protection for Inverter Based Resources– A Way Forward with Past Learnings to protect the Future Grid

V. CHAKRAPANI[1], Z. ZHANG[2], I. VOLOH[3]
[1]GE Vernova United Kingdom; [2]Utility Automation Solutions; [3]GE Vernova Canada

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Renewable Energy, Inverter Based Resource, Power System Protection, Distance Protection, Unconventional source, Model based design.

Avoiding Surprises with Model Based Twin for Protective Relays

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources

Wide Area Protection Based on Phase Angle of Sequence Components

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ID: 12071
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Low-voltage AC networks; fault detection and classification; deep learning; data-driven distribution network protection, LSTM

An Improved AI-Driven LVAC Network Fault Detection and Classification

J. YU[1], F. FILGUEIRA[2], M. DINIZ[3], Y. QI[4], J. LI[4], M. MA[4], J. YANG[4]
[1]CIGRE UK; [2]CIGRE SPAIN; [3]Scottish Power Energy Networks UK; [4]Glasgow University UK

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources

Network protection performance audits under high levels inverter-based generation systems

A. INSIGNARES[1], J. AGUDELO[2], L. AGUDELO[3], D. ECHEVERRI[4], B. GUERRERO[5], J. GONZALES[6]
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Topics: B5 PS2 - Protection and control in networks with unconventional sources

Static Synchronous Series Compensator (SSSC) and its Challenge for

G. GUTIERREZ[1], J. CALDERON[2]
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources

Methodology for Selecting Line Protection Schemes in Substations in EPM

J. CARROLL[1], R. ALVAREZ[2], J. VARGAS[3]
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ID: 12357
B5 PROTECTION AND AUTOMATION - Full Papers

Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Distance Protection, Converter-dominated grids, EMT, HiL, Converter Control

Multi-State Investigation of Distance Protection in Converter-Dominated Grids: From Steady-State to EMT and HIL

S. ANHAUS, A. DAMJANI, W. LETERME
IAEW at RWTH Aachen University

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: fault-clearing time, loss of generation, protection requirement, short circuit, voltage drop area

Requirements for Protection Concepts in High-Voltage Networks with High Penetration of Decentralized Generation Systems in Distribution Networks

T. REIMANN, G. SCHMIDT-BANERJEE, D. HILBRICH, T. DEGNER
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources

Protection Toolchain - A modular toolchain for automated protection concepts in multivariate power systems

G. J. MEYER[1], M. DAUER[1], D. HOLTSCHULTE[2], T. LORZ[3]
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ID: 12458
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Unconventional resources, Hybrid Renewable Power Plants, Grid Stability, Centralized Control, Reliability, Photovoltaic, Solar Integration, Wind Turbines, Pump Storages, Remote Terminal Unit

Advanced Centralized Control Strategies for Hybrid Renewable Plants

R. K. GUPTA[1], M. M. ISLAM[2], A. YADAV[1]
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources

Challenges and solutions for the distance protection in networks with unconventional sources

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: Microgrid, Relay Protection, Distributed Generator, Energy Storage Device, Adaptive Protection, Fault Analysis

Relay Protection Schemes for Medium-Voltage Microgrids with Grid-Forming/Grid-Following Generators and Energy Storage System

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ID: 12623
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Protection and control in networks with unconventional sources
Keywords: HVDC transmission systems, Metallic return conductor, Fault location, Frequency-domain analysis, Protection systems

A Frequency-Based Fault Location Method for Overhead Metallic Return Conductors in HVDC Transmission System

D. RUFINI[1], L. BUONO[2], F. PALONE[3], L. PAPI[4], G. TRESSO[5], P. VACANTE[6]
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