

2019 International Symposium on Lightning Protection (XV SIPDA 2019)

**Sao Paulo, Brazil
30 September – 4 October 2019**



**IEEE Catalog Number: CFP1911W-POD
ISBN: 978-1-7281-1892-5**

**Copyright © 2019 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP1911W-POD
ISBN (Print-On-Demand):	978-1-7281-1892-5
ISBN (Online):	978-1-7281-1891-8

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

ELECTRIC FIELD SENSOR CALIBRATION USING HORIZONTAL PARALLEL PLATES.....	1
<i>Clovis Lasta Fritzen ; Widinei Alves Fernandes ; Airton Carlos Notari ; Waldeir Moreschi Dias ; Giovanni Macedo Rescigno ; Thiago Rangel Rodrigues ; Moacir Lacerda</i>	
WIND TURBINE LIGHTNING PROTECTION OF BLADES, ELECTRONICS AND HUMANS.....	6
<i>Bruce Glushakow ; Haiyan Qin</i>	
ELECTRIC FIELD OF HORIZONTAL GROUNDING ELECTRODES.....	14
<i>Marco Aurélio O. Schroeder ; Mana Teresa Correia de Barros ; Antonio C. S. Lima ; Rodolfo A. R. Moura ; Pedro Henrique Nascimento Vieira</i>	
THE USAGE OF JULIA PROGRAMMING IN GROUNDING GRIDS SIMULATIONS : AN ALTERNATIVE TO MATLAB AND PYTHON	20
<i>Rodolfo A. R. Moura ; Marco A. O. Schroeder ; Samuel J. S. Silva ; Erivelton G. Nepomuceno ; Pedro H. N. Vieira ; Antonio C. S. Lima</i>	
COMPUTING TOWER-FOOTING GROUNDING IMPEDANCE AND GPR CURVES OF GROUNDING ELECTRODES BURIED IN MULTILAYER SOILS	24
<i>Anderson R.J. de Araújo ; Jaimis S.L. Colqui ; Sérgio Kurokawa ; Claudiner M. Sexias ; Behzad Kordi</i>	
CONDUCTIVE FABRIC POTENTIAL RISE DUE TO LIGHTNING IMPULSE CURRENTS	32
<i>C. Jorge Alejandro Cristancho ; M. Jorge Enrique Rodríguez ; G. Carlos Andrés Rivera ; Francisco Román ; Liz Karen Herrera ; John J. Pantoja</i>	
PUBLIC BELIEFS ABOUT LIGHTNING IN MALAYSIA	38
<i>A.R. Syakura ; C. Gomes ; E. Trengove ; M. Z. A. Ab Kadir</i>	
AN INSIGHT ON THE IEC 61400-24 ED2: LIGHTNING PROTECTION OF WIND TURBINES.....	44
<i>Y. Méndez Hernández ; S. F. Madsen ; T. S. Sorensen ; Y. Yasuda ; J. Birkl ; S. Yokohama ; J.A. Plumer ; K. Yamamoto</i>	
TRANSIENT ANALYSIS OF BURIED CABLES CONSIDERING A NODAL ADMITTANCE MATRIX APPROACH.....	50
<i>Naiara Duarte ; Alberto De Conti ; Rafael Alipio</i>	
LMA OBSERVATION OF UPWARD BIPOLAR LIGHTNING FLASH AT THE SÄNTIS TOWER.....	56
<i>A. Sunjerga ; M. Rubinstein ; A. Mostajabi ; M. Azadifar ; N. Pineda ; D. Romero ; O. Van der Velde ; J. Montanya ; G. Diendorfer ; J. Figueras i Ventura ; N. Besic ; J. Grazioli ; A. Hering ; U. Germann ; F. Rachidi</i>	
A REGIONAL POWER LOADS COORDINATED-FORECASTING METHOD BASED ON REAL TIME LIGHTNING DETECTION	61
<i>Jianqiang Miao ; Chong Tong ; Yunfeng Cai ; Ning Wang ; Yang Xu ; Jinwen Mai ; Haiyan Jiang ; Jianyong Zheng ; Jian Xu</i>	
CHARACTERIZATION OF POSITIVE RETURN STROKES FROM A THUNDERSTORM DAY OBSERVED IN BOGOTA, COLOMBIA	66
<i>Maria Isabel Nino ; Herbert Enrique Rojas ; Francisco Roman</i>	
RELATION BETWEEN THE MATERIAL OF ROOF AND THE RISK OF LIGHTNING CAUSED DAMAGE.....	72
<i>Zoltán Tóth ; István Kiss ; Bálint Németh ; Norbert Szedenik</i>	
LIGHTNING MONITORING SYSTEM, A CASE STUDY APPLIED TO THE IRON ORE MINING. AN APPROACH TO MEETING STANDARDS IEC 62793-5, IEC 627139 IEC 62305/NBR-5419	76
<i>Waterson dos Santos Soares ; Fabricio Omar Gomes Fonseca</i>	
ELECTRICAL ISOLATION OF TWO EARTHING SYSTEMS UNDER LIGHTNING CONDITIONS WITH TiO₂ NANO FLUID BARRIER.....	82
<i>C. Gomes ; M. Izadi</i>	
USING ELECTROMAGNETIC TIME REVERSAL SIMILARITY METRIC TO LOCATE LIGHTNING-ORIGINATED FLASHOVERS ON OVERHEAD TRANSMISSION LINES.....	87
<i>Zhaoyang Wang ; Francesco Gerini ; Mario Paolone ; Carlo Alberto Nucci ; Farhad Rachidi</i>	
IMPLEMENTATION OF THE ANALYTICAL METHOD FOR THE LIGHTNING PERFORMANCE ASSESSMENT OF POWER LINE WITH LINE LIGHTNING PROTECTION DEVICES	93
<i>Belko Dmitriy ; Zhitenev Mikhail</i>	
SIMULATION OF A LIGHTNING PROTECTION SYSTEM CONSIDERING THE DIFFERENT PROTECTION LEVELS.....	99
<i>Tuany Lucietti ; Vilson Luiz Coelho ; Giovanna de Lorenzi Canever</i>	

ANALYSIS OF THE MAXIMUM OVERVOLTAGES CONDUCTED TO THE LOW VOLTAGE ELECTRIC INSTALLATIONS.....	107
<i>Adroaldo Raizer ; Vilson Luiz Coelho ; Taiane Pereira dos Reis</i>	
EVALUATION OF THE STATISTICAL CHARACTERISTICS OF GROUNDING IMPULSE IMPEDANCE OF TRANSMISSION LINE TOWERS.....	113
<i>Kamila Costa ; Rafael Alipio ; Matheus Duarte ; Gabriel Matoso ; Rosilene Dias</i>	
EQUIVALENCE BETWEEN TRIANGULAR AND HEIDLER FUNCTIONS FOR CALCULATIONS OF LIGHTNING OVERVOLTAGES ON TRANSMISSION LINES.....	120
<i>Giovanna L. Canever ; Luana Batista Moraes ; Michele N. N. Santos ; Alexandre Piantini</i>	
GLOBAL AND BRAZILIAN PERSPECTIVES ON MANAGING GROUND POTENTIAL RISE AT OVERHEAD AC TRANSMISSION STRUCTURES DURING POWER FREQUENCY FAULTS : INVITED LECTURE: CIGRE TECHNICAL BROCHURE 694 TUTORIAL.....	125
<i>William A. Chisholm ; José A Jardini ; Paulo Edmundo Freire ; CA George Watt ; FR Lionel Figueroa ; BR Oswaldo Regis</i>	
OVERVOLTAGE SUPPRESSION IN HALF-WAVELENGTH TRANSMISSION SYSTEMS USING LINE SURGE ARRESTERS.....	145
<i>Felipe Proença ; Ronaldo F. R. Pereira ; Eduardo C. M. Costa ; Luisa Helena B. Liboni</i>	
ESTIMATION OF GROUNDING RESISTANCE OF TRANSMISSION LINE TOWERS BASED ON ARTIFICIAL NEURAL NETWORKS: A PRACTICAL ANALYSIS BASED ON A DEVELOPED ANDROID APP.....	151
<i>Raphael Batista ; João R. Souza</i>	
TESTING OF WIND TURBINE LIGHTNING PROTECTION SYSTEMS - COMPARISON OF TESTING THE FULL-SCALE BLADE LENGTH AND A SMALL SECTION OF THE BLADE TIP.....	157
<i>Godson I. Ikhazuangbe ; Mumtaj Begam ; Chandima Gomes ; Anandan Shanmugam ; Agbeb Stephen ; Philip Kpae ; Edward Jaja</i>	
SWITCHING TRANSIENTS DUE TO A POWER FACTOR CORRECTION CAPACITOR BANK IN LV POWER SYSTEM AND THEIR COMPARISON WITH LIGHTNING IMPULSES.....	163
<i>S. G. Mohammad ; C. Gomes ; M. R. Mehrjou</i>	
A CASE STUDY OF LIGHTNING COUPLING SIMULATIONS SUPPORTING THE DESIGN OF NEW AIRCRAFT.....	173
<i>José Antônio de Souza Mariano ; Antônio Carlos da Cunha Migliano ; Rodrigo Cabaleiro Cortizo Freire</i>	
BRCLIGHTNING - RISK ANALYSIS AND SCALING FOR PROTECTION AGAINST ATMOSPHERIC DISCHARGE.....	180
<i>Biagione Rangel de Araujo</i>	
ALTERNATIVE METHODS TO CALCULATE ELECTROMAGNETIC TRANSIENTS IN GROUNDING SYSTEMS.....	188
<i>Jaimis S. L. Colqui ; Anderson R. J. de Araújo ; Sérgio Kurokawa ; Claudiner M. Seixas</i>	
3D-FDTD COMPUTATION OF LIGHTNING ELECTROMAGNETIC FIELDS IN THE PRESENCE OF A MOUNTAIN AND A RIVER.....	197
<i>Kaddour Arzag ; Zin-Eddine Azzouz ; Yoshihiro Baba</i>	
PERFORMANCE ENHANCEMENT OF LIGHTNING PROTECTION SYSTEMS FOR OFFSHORE WIND TURBINE BLADES.....	203
<i>Godson I. Ikhazuangbe ; Mumtaj Begam ; Chandima Gomes ; Anandan Shanmugam ; Ahmad Safawi ; Bob Dagogo ; Edward Jaja</i>	
SIMPLIFIED 3-D MODELING OF REINFORCED CONCRETE FOR THE CALCULATION OF TRANSIENT ELECTROMAGNETIC FIELDS INSIDE A BUILDING STRUCK BY LIGHTNING.....	212
<i>S. Naranjo-Villamil ; J. Gazave ; C. Guiffaut ; A. Reineix</i>	
USING ARTIFICIAL NEURAL NETWORKS TO ESTIMATE THE EQUIVALENT RESISTIVITY FROM TYPICAL TRANSMISSION LINE TOWERS GROUNDING ARRANGEMENT IN A TWO-LAYER SOIL.....	219
<i>Raphael Batista ; João R. Souza</i>	
LIGHTNING OVERVOLTAGES IN COPEL'S COMPACT URBAN TRANSMISSION LINES: MODELING AND COMPARISON OF COMPACT AND SUPERCOMPACT ARRANGEMENTS.....	225
<i>Muryllo Amalio Souza ; Ulisses Chemin Netto</i>	
LIGHTNING INCIDENCE OVER THE SOUTHEASTERN MICROREGION OF PARA STATE, BRAZIL.....	230
<i>Elton Rafael Alves ; Luis Felipe Pinto Monteiro ; Leal Adonis F. R.</i>	
LIGHTNING-INDUCED VOLTAGE CALCULATIONS ON AN OVERHEAD INSULATED CABLE.....	235
<i>Alberto De Conti ; Osís E. S. Leal</i>	
NUMBER OF SINGLE STROKE FLASHES IN THE ALPINE REGION OF AUSTRIA.....	239
<i>Lukas Schwalt ; Stephan Pack ; Wolfgang Schulz ; Georg Pistochnik</i>	

DETECTION EFFICIENCY ANALYSIS OF ATMOSPHERIC DISCHARGES USING AS3935 SENSOR : DATA CORRELATION OF LINET NETWORK	245
<i>Armando Heilmann ; Elielton Matias da Silva ; Horácio Tertuliano Filho ; Joice Cristine Schuhmann ; Augusto Mathias Adams ; César A. Dartora ; David Clístenes Furoni de Lima ; Ezequiel Burkarter</i>	
DEVELOPMENT OF A MOBILE DESIGN TEMPLATE FOR SUBSTATION EARTHING SYSTEM	252
<i>Siow Chun Lim ; Mohamed Najib Harami</i>	
SURFACE TRANSFER IMPEDANCE CHARACTERIZATION OF SHIELDED CABLES	258
<i>Rodrigo Cabaleiro Cortizo Freire ; José Antônio de Souza Mariano</i>	
EXPERIMENTAL VALIDATION OF ELECTRICAL MODEL RESIDUAL VOLTAGE TEST CIRCUIT IN SURGE ARRESTERS	264
<i>William Moreira de Assis ; Mellina Modesto Lisboa ; Alander Rocha Ribeiro ; Marcus Vinicius Alves Nunes ; André Melo Moraes ; Allan Rodrigo Mnfano Manito ; Antonio Fernando Martins Cardoso ; Adonis Ferreira Raiol Leal ; Adnane Barbosa de Brito</i>	
550 KV HVDC TRANSMISSION LINE SURGE ARRESTER: EMTP-ATP SIMULATION MODEL	271
<i>Cristian C. C. Acosta ; Francisco Román</i>	
LIGHTNING CAUSED MULTIPLE DEATHS: LETHALITY OF TAKING SHELTER IN UNPROTECTED BUILDINGS	278
<i>Chandima Gomes ; Mehdi Izadi</i>	
COORDINATED SURGE PROTECTION SYSTEM IN A TT WIRING SYSTEM: A COMPREHENSIVE ANALYSIS OF PERFORMANCE	285
<i>Chandima Gomes ; Ashen Gomes</i>	
IMPULSE IMPEDANCE MEASUREMENT METHODOLOGY IN SPACE RESTRICTED LOCATIONS	293
<i>Adroaldo Raizer ; Vilson Luiz Coelho ; Thiago Schmoeller</i>	
A VERTICAL GROUNDING ARRANGEMENT THAT DIMINISHES IMPULSE COEFFICIENT IN A TWO-LAYERED SOIL	299
<i>Raphael Batista ; Carlos E.F. Caetano ; José O.S. Paulino ; Wallace C. Boaventura</i>	
LIGHTNING INCIDENT WITH MULTIPLE NATIVES INJURED IN THE SIERRA NEVADA DE SANTA MARTA - COLOMBIA: DESCRIPTION OF SCENARIO	307
<i>C Jorge Alejandro Cristancho ; M Jorge Enrique Rodríguez ; G Carlos Andrés Rivera ; Francisco Román</i>	
FREQUENCY DEPENDENT PERMITTIVITY OF SOIL AND BENTONITE: FOR LIGHTNING PROTECTION AND HIGH FREQUENCY EARTHING SYSTEMS	314
<i>R. Z. Sabry ; A. Gomes ; C. Gomes ; M. Z. A. Ab Kadir ; N. B. Misron</i>	
LOCATING LIGHTNING USING ELECTROMAGNETIC TIME REVERSAL: APPLICATION OF THE MINIMUM ENTROPY CRITERION	318
<i>Hamidreza Karami ; Amirhossein Mostajabi ; Mohammad Azadifar ; Zhaoyang Wang ; Marcos Rubinstein ; Farhad Rachidi</i>	
PERFORMANCE ANALYSIS OF THE MOVING COMPUTATIONAL DOMAIN TECHNIQUE FOR THE CALCULATION OF SFERICS	322
<i>Wenhao Hou ; Farhad Rachidi ; Mohammad Azadifar ; Marcos Rubinstein ; Qilin Zhang</i>	
Author Index	