

# **2024 IEEE 7th International Conference on Condition Assessment Techniques in Electrical Systems (CATCON 2024)**

**Kolkata, India  
22-24 November 2024**



**IEEE Catalog Number: CFP2420V-POD  
ISBN: 979-8-3315-0777-0**

**Copyright © 2024 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:	CFP2420V-POD
ISBN (Print-On-Demand):	979-8-3315-0777-0
ISBN (Online):	979-8-3315-3066-2

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

## Table of Contents

Paper ID	Paper Title	Authors	Page
7	Degradation Study of Oxidatively Aged Natural Ester Oil Immersed Pressboard Insulation	Deepak Kanumuri, Ambuj Kumar, Subhendu Sekhar Sahu, Satyajeet Anand, Niharika Baruah, Sisir Kumar Nayak	1
12	Real-Time Monitoring of Grid Conditions for Renewable Energy Compatibility	Sujoy Ranjan Nath, Prithwiraj Purkait	7
13	Non-invasive Early Breast Tumor Detection Using Antenna Array	Navneet Rai, Ayush Agnihotri, Aman Singh, Md Jawaid Alam	13
50	Effect of Variation in Measurement Temperature on the Uniqueness of Time-Varying Insulation Model and Associated Diagnosis	Somesh Ganguly, Arijit Baral, Sivaji Chakravorti	19
64	Investigation of Synthetic Inductance for Resonant Shunt Circuit Applied to Vibration Control	Braion B. De Moura, Marcela R. Machado, Tanmoy Mukhopadhyay, Sudip Dey	25
68	Remnant Life Estimation of Power Transformer using Fuzzy Logic	Mulpuru Gopi, Chilaka Ranga, Kushal M Jagtap, Teruvai Manoj, Nasir Ul Islam Wani	30
70	Investigations on Physico-Chemical Properties of Natural Ester Oil-Impregnated paper Insulation Under Accelerated Thermal Ageing	Soumya Chatterjee, Arijit Baral	35
72	Design and Development of a Solar-Wind Hybrid Electric Vehicle Charging Station	Srabani Mandal, Shampa De	39
73	Cross-correlation based Identification of Faulty Phase for an Interconnected Power System	Biswapriya Chatterjee, Shoubhik Kumar Guha, Animesh Upadhyay, Saroj Kumar Mahato, Aliul Sk, Ghazi Khatib Imam	45
74	A Theoretical Study of the Effects of Temperature Variation on Activation Energy in Oil-Paper Insulated Transformer	Sandip Kumar Ojha, Anupam Sen, Prithwiraj Purkait, Sivaji Chakravorti	50
75	Performance Evaluation of Superhydrophobic Coated Polymeric-Housed Surge Arresters under Various Operating Conditions	M-Ramez Halloum, Subba Reddy B., Youssef Razouk	56
78	Experimental Studies on the Performance of Electromagnets used in Shutdown System of Sodium Cooled Fast Reactor	Sthitapragyan Pattanayak, Sivakumar S, Giribabu R, Muralitharan G	62
82	Classification of Electrical Tree Growth Stages in XLPE Cable Insulation using CNN and Pre-trained CNNs	Raseswar Sahoo, Satyajit Panigrahy, Subrata Karmakar	67
83	Partial Discharge in Power Transformers: Approaches for estimating number of Sources	Raj Kumar Mandal, Harimurugan Devarajan, T Bhavani Shanker	72
84	ML-Based Improved Incipient Fault Detection in Power Transformers using DGA Data	Deepanjan Das, Saptarshi Pani, Sivaji Chakravorti, Arijit Baral	77
85	Effect of High-Voltage Transmission Lines on Nearby Residential Buildings	Anagha E R, Himanshu J Bahirat	82
86	Broken Defect Localization of Glass Insulators with Oriented Bounding Box Model	Satyajit Panigrahy, Raseswar Sahoo, Subrata Karmakar	87
88	Applicability of Modal Analysis on Health Condition Assessment of Transformers under Uniform and Non-Uniform Clamping Pressure Change	Amita Singha, Jakob Pallot, Chandima Ekanayake	92

## Table of Contents

Paper ID	Paper Title	Authors	Page
90	Monitoring of Partial Discharge Inside High-Voltage Power Transformer Using UHF Sensors	Sourav Dhara, Chiranjib Koley, Sivaji Chakravorti	97
91	Investigations on the Dielectric Properties of Mineral Oil and Natural Ester Mixed Liquid Insulation for Power Transformers	Soumya Chatterjee, Suchandan Das, Arup Kumar Das	102
93	Preventing Transformer Explosions with Fast Arc Detection by Fiber Optic Sensors	Aref Sharifi, Moritz Kuhnke, Peter Werle, Asghar Akbari	106
94	Evaluation of Blended Mineral and Ester Oil Nanofluids for Transformer Applications	Prabhat Kumar Maiti, Manas Chakraborty, Manish Kumar, Moumita Naskar	111
95	The requirement of islanding in power system A case study of CTPS, DVC	Pankaj Kumar Singh, Rohan Kumar, Abhimanyu Kumar Singh	116
96	Analysis of method to find out interturn fault before brazing of loop bar and phase bar of 250MW(THRI Type) during Generator rewinding process	Pankaj Kumar Singh, Sandeep Kumar, Shakeel Ahmad	125
97	AC Conductivity Measurement of Conductor Sleeves	Ritesh Kumar, Pranav Johri, Parimal Sharma, C. C. Reddy	129
98	Location of Damaged Insulation For an Underground Power Cable Under High-Frequency Model	Aritra Das, C. C. Reddy	133
99	Investigation of Sheath Current at Different Joints for Different Types of Bonding during Busbar Fault	Aritra Das, S. M. Anas, C. C. Reddy	138
100	Wideband Omnidirectional Ultra High-Frequency Sensors for Detection of Partial Discharge Sources in Air-Insulated Electrical Substations	Anitha Bhukya, Chiranjib Koley	142
102	Case study of failure of neutral flexible link and hexagonal bus header plate and palm connector of 210MW generator and recommendations to prevent similar faults	Suman Maharana, Sandeep Kumar, Arnab Sow	147
103	Effect of Thermal Stress on MV Cable Insulation	Harshith Kumar Azmeera, Syed Mohammad Anas, C. C. Reddy	151
104	Multi-resolution Analysis of Transient Overvoltages using Entropic Empirical Mode Decomposition	Gaurav J Bairagi, Kaveri Bhuyan, Jyotishman Boruah, Pradipta Ghosh, Saibal Chatterjee	155
105	Condition Assessment of Transformers and Switchyards Using DGA and Thermography: A Case Study of DVC Power Plant	Abhishek Kumar, Sk. Mohammad Yasin, Mehebab Alam, Rajiv Ranjan Sinha	161
106	Intelligent Diagnosis of Transformer Faults Using DGA	Akshay Dhiman, Harshith Kumar Azmeera, C. C. Reddy	166
107	Effect of TiO <sub>2</sub> and ZnO on the Dielectric Properties of Natural Ester Oil Nanofluid Impregnated Pressboard Insulation	Subhendu Sekhar Sahu, Deepak Kanumuri, Ambuj Kumar, Sisir Kumar Nayak	171
108	Effect of Furfural on Dielectric Characteristics of Mineral Oil	Ambuj Kumar, Deepak Kanumuri, Subhendu Sekhar Sahu, Niharika Baruah, Sisir Kumar Nayak	177
109	A Novel Frequency Response Analysis for Faulty Phase Identification in Star-Connected HV Windings: An Experimental Study	Tirlingi Madhava Rao, Saurav Pramanik	181
110	AC and DC Electro-Thermal Aging Analysis of Polymeric Housed Surge Arresters	G Nithin Reddy, Subba Reddy B, Jangamreddy Rajasekhar Reddy, Kosigi Shroff Shreyas	187

## Table of Contents

Paper ID	Paper Title	Authors	Page
112	Effect of Insulation Bulging on the Electric Field Distribution in AC Cables	Priti Mishra, Pranav Johri, Parimal Sharma, C. C. Reddy	191
113	Investigations on the Revision in the Eccentricity Limits to Improve the Performance of Extruded HVDC Cables	Pranav Johri, C. C. Reddy	196
114	Effect of Curing on the AC and DC Breakdown Strength of Cable Insulation	Syed Mohammad Anas, Harshith Kumar Azmeera, C. C. Reddy	201
115	Modeling of the Dielectric Response of XLPE Cable Insulation: Insights from Accelerated Water Tree Aging Experiments	Aadil Jamshed, Nasirul Haque, Soumya Chatterjee	204
116	Online fault location in high voltage distribution lines: A case study of DVC network	Mehebab Alam, Rajiv Ranjan Sinha, Rakesh Kumar, Ravi Roshan	208
117	Investigation on Cable Breakdown using Aluminium Foil as Electrode	Parimal Sharma, Ritesh Kumar, C. C. Reddy	213
118	Detection of Interface Failure Based on Thermal Imaging in Outdoor Composite Insulators	Ashok Narayan Tripathi, Alok Ranjan Verma	216
120	Investigating the Loading Effects of a Real-Life Three-Phase Transformer on an Impulse Voltage Generator in a Simulated Environment	Pradipta Ghosh, Kaveri Bhuyan, Biswajit Chakraborty, Sovan Dalai, Saibal Chatterjee	220
121	Real-Time Performance Monitoring of an Optimal Energy Management Scheme for Grid-Connected PV-Battery System	Sujoy Ranjan Nath, Biuhai Chatterjee, Rishov Sarkar, Prithwiraj Purkait	225
123	Ageing State Estimation of Insulating Oil used in High Voltage Equipment by Electric Modulus	Sandipan Kumar Paul, Biswajit Chakraborty, Subhajit Maur, Biswendu Chatterjee, Sovan Dalai, Arpan Kumar Pradhan	231
124	Investigation of Electric Field Effect on Space Charge Dynamics of Epoxy-TiO <sub>2</sub> Nano-Composites Using IRC and QCC Analysis	Sandipan Kumar Paul, Subhajit Maur, Biswajit Chakraborty, Sovan Dalai, Biswendu Chatterjee, Subrata Biswas, Arpan Kumar Pradhan	237
125	Study on Insulating Characteristics of Aged Epoxy Nano-composite Insulation under Lightning Impulse	Soumyadeep Maity, Pradipta Ghosh, Subhajit Maur, Biswajit Chakraborty, Sovan Dalai, Biswendu Chatterjee, Saibal Chatterjee	243
128	Analysis and Discrimination of Transformer Inrush current and Fault Current	Tryambwak Biswas, Shampa De, Arijit Basuray	249
129	A Time-Efficient and Innovative Method to Determine the DP Value of Power Transformer Insulation	Deepak Mishra, Shabnam Parveen, Arijit Baral, Sivaji Chakravorti	255
132	Artificial Intelligence-Enabled Intelligent Monitoring for Anomaly Detection in Inductor Current of PSFB Converter for Fast EV Charging Application	Subhabrata Pal, Rishiraj Sarker, Avik Bhattacharya	260
133	Monitoring of Solar PV Maximum Power Point Tracking Performance in Real-Time using Different Optimization Techniques	Sujoy Ranjan Nath, Souvik Das, Debadrito Chowdhury, Prithwiraj Purkait	266
134	Performance Evaluation of Nano Zirconia Doped Silicone Rubber Nanocomposites Under Electrolytic Environments	Dhanunjaya Naidu Vangapandu, Palash Mishra, R. Sarathi, M. Tariq Nazir, Stefan Kornhuber, Mithun Mondal	272
135	Very Fast Front Transient Overvoltage's Surge Transfer Characteristics of 145 kV Three Phase Encapsulated Gas Insulated Current Transformer	K Urukundu, C Pallavi, A Vamsee Krishna, K Devender Rao, T Bhavani Shanker, Jagan Mohan	277

## Table of Contents

Paper ID	Paper Title	Authors	Page
136	Detection and Classification of Power Quality Disturbances in Smart Grids Using Detrended Fluctuation Analysis and SVM Classifier	Pintu Das, Chandan Jana, Sannistha Banerjee, Subhajit Maur, Sovan Dalai	282
137	Evaluation of Fire Resistance and Smoke Properties of Fire Resistance Coating and Paints	Arunjothi R, Thirumurthy, Satheesh Kumar P V, Meena K P	287
138	Monitoring Oil Level in Distribution Transformers using Ultrasonic Sensors	G. Girija, Nepak Uttej, Swaraj Kumar Das	292
139	Investigations on the Suitability of Modern Denoising Methods for Impulse Fault Current Waveforms	Aishanee Chatterjee, Debangshu Dey	296
140	Localized Contamination Severity Assessment on SiR Insulators Using mRMR-Aided SVM and Mathematical Morphology	Rajat Kumar Mandal, Subhajit Maur, Biswendu Chatterjee, Susanta Ray, Sovan Dalai	302
141	On-Line Acoustic Emission technique for Condition Assessment and Detection of defects in 400kV Oil-Cooled Type Shunt Reactors-Case studies	T. Bhavani Shanker, Ukaram, A. Sheik Mohamed, V Vaidhyanathan	308