

IEEE INTERNATIONAL SYMPOSIUM ON ELECTRICAL INSULATION

ISEI 2006

11 – 14 June 2006

**Delta Chelsea Hotel
Toronto, Ontario, Canada**

FINAL PROGRAM

(17 May 2006)

INTRODUCTION

Welcome to ISEI 2006 and thank you for choosing to participate in the Symposium. The following pages describe the technical program and events that will comprise the 2006 IEEE International Symposium on Electrical Insulation. This is the sixteenth biennial conference in the series that began in 1976. Consistent with previous years this conference is directed towards those who develop, test or use electrical insulation in electrical equipment. The technical program will be the centerpiece of ISEI 2006 and we look forward to hearing and discussing the 140 papers that have been received from industrial, utility and academic organizations in 24 countries. Oral sessions will be held during the day and will focus on practical issues that are of concern to those who work with transformers, rotating machines, cables, outdoor equipment and switchgear. During these sessions you will find answers to your questions on what new insulation products are available, as well as what new developments are being made in diagnostic testing, life assessment and the rapidly expanding field of nano-dielectrics. A poster session will be held on the evening of Monday, June 12. The contributions in the poster session will address both practical application issues as well as research into new materials and test methods. The poster sessions will allow you to discuss developments on an informal basis with leading researchers.

Short Courses have been scheduled during ISEI 2006 that will provide basic information on a range of topics including a course designed to meet the needs of those who are new to our field and may need a better understanding of insulating material.

Finally, a number of working groups that are developing or revising IEEE standards related to electrical insulation as applied to rotating machines will be meeting during ISEI 2006. You will be welcome to attend these meetings and be a part of the ongoing process to improve these documents.

Toronto, located on the northern shore of Lake Ontario, is a large multicultural city offering a diverse range of cultural activities for visitors. The city is located approximately 90 minutes from Niagara Falls and in proximity to many provincial parks that cater to those interested in outdoor pursuits.

I trust that you will find the conference technically interesting and stimulating and that you enjoy your stay in Toronto.

Howard Sedding
ISEI General Conference Chair
April 27, 2006

2006 SYMPOSIUM ORGANIZATION

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Nancy Frost, Von Roll Isola, NY, USA

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LOCAL ARRANGEMENTS

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PUBLICATIONS

Bal Gupta, AOK Technologies, ON, Canada

PUBLICITY

Shesha Jayaram, University of Waterloo, ON, Canada

SHORT COURSES

Harry Orton, OCEI, BC Canada

DEIS MEETINGS CHAIR

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GENERAL INFORMATION

Toronto is the most diverse city in the world. It's culture encompasses the perspective of a hundred cultures. Toronto offers visitors myriad opportunities to experience it's diversity. Enjoy the beautiful architecture of the city's settlers alongside modern, sleek, gold-tinted skyscrapers. Take time to explore Toronto's museums, art galleries, sidewalk art, and restaurants. Situated on the northern shore of Lake Ontario, Toronto is one of the southernmost cities in Canada. In fact, its latitude is very close to that of northern California. As a result, Toronto has a surprisingly moderate climate – with the warmest springs and summers in Canada. In June, the average temperature is 17C (63F).

GETTING AROUND

Explore Toronto on one of North America's finest transportation systems – the TTC. With easy to navigate subways, buses and streetcars, getting around the city is a snap. When using the TTC a single fare will take you anywhere in the city on a one way trip. You can freely transfer between subway, streetcar and bus, but make sure you obtain a transfer when and where you pay your fare. On buses and streetcars, exact change is required.

GO Transit is Ontario's inter-regional bus and train service. It links Toronto with outlying areas of the Greater Toronto and beyond. GO Trains and buses depart from Toronto's Union Station at regular intervals throughout the day.

Driving Around Town

- Toronto's streets follow a basic grid pattern and are easy to navigate
- Speed limit signs are posted on each street
- The city's "rush hour" is more than an hour long – count on heavy traffic from 7:00-9:00 a.m. and again from 4:00-6:00 p.m.

Plenty of Toronto's major streets have bicycle lanes nearest the curb. Please respect cyclists in the city – they're environmentally friendly!

AREA SITES OF INTEREST

Art Gallery of Ontario - Founded in 1900 by a group of private citizens as the Art Museum of Toronto, the Art Gallery of Ontario is now the 10th largest art museum in North America, with a physical facility of 486,000 square feet. The AGO currently has more than 40,000 works in its collection, spanning 100 AD to present day. The AGO is located at 317 Dundas Street West, at the corner of Dundas and McCaul streets.

The ambitious redevelopment of the **Royal Ontario Museum** is one of the world's largest museum restoration and expansion projects. Through the restoration of the original heritage architecture and the construction of a new landmark building, Renaissance ROM creates a spectacular new experience of collections. In addition to the galleries, a visit to the new ROM will also offer an array of creature comforts: comfortable gathering places, simple signage, easier accessibility, first-rate restaurants, fine retail shops and unique spaces for special events

Located at 100 Queen's Park at Bay Street and Bloor Street.

Niagara Falls, and the surrounding Niagara Region, has evolved and grown into one of the world's foremost travel destinations. Niagara offers family entertainment as well as casinos and night-life. The internationally renowned wine region is home to more than 50 world-class wineries and has gained an appreciative audience, while the culinary expertise, flavoured by the agricultural heritage and regional cuisine has added to the rich dimension of Niagara as a wine and food destination. Niagara Falls is approximately 90 minutes drive from Toronto along the Queen Elizabeth Highway.

TRANSPORTATION AND DIRECTIONS

Driving directions from Airport to Hotel:

Exit airport to Hwy 427 South

Exit Hwy 427 to Gardiner Expressway East

Exit Gardiner Expwy at Bay Street North
Follow Bay Street to Gerrard Street
Turn right

Hotel parking is \$23 per day with in/out privileges

Taxi from the airport to the hotel approximately \$45

Shuttle - Pacific Western Airport Express available every 30 minutes from the Airport to the hotel. Cost \$16.45 one way.



**IEEE DIELECTRICS AND ELECTRICAL
INSULATION SOCIETY (DEIS)**

The DEIS is responsible for leadership, coordination and communication among engineers, chemists, mathematicians and physicists who are concerned with dielectric phenomena and with development and characterization of all gaseous, liquid and solid electrical insulating materials in electrical and electronic circuits and systems under all conditions of use.

Membership in the DEIS (only an additional \$25 per year with IEEE dues) includes a subscription to the *IEEE Transactions on Dielectrics and Electrical Insulation* and the *IEEE Electrical Insulation Magazine*, both published bi-monthly. Among the other benefits of the Society, all DEIS members also receive information on all DEIS sponsored meetings and events. For membership and other information please see the IEEE homepage <http://www.ieee.org> which also provides a link to the DEIS website under "IEEE Societies".

The current executive members of the DEIS are:

President: R. Hebner
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Vice-President Administration: W. McDermid
Manitoba Hydro, Canada

Vice President Technical: H. Kirkici
Auburn University, USA

Treasurer: S. Bamji
National Research Council of Canada, Canada

Secretary: P. McGrath
Clarkson University, USA

IEEE WORKING GROUP MEETINGS

The following IEEE working groups will be meeting during ISEI 2006 on the development or revision of standards.

Sunday, June 11, 2006

- 08:00 – 10:00** IEEE Std 56 – Guide for Insulation Maintenance of Large Alternating-
Carlyle Current Electric Machinery
Chair: Doug Conley
- 10:00 – 12:00** Stator Cores
Carlyle *Chair: Glenn Mottershead*
- 13:00 – 15:00** IEEE Std 1310 – Recommended Practice for Thermal Cycle Testing of
Carlyle Form-Wound Stator Bars and Coils for Large Generators
Chair: Greg Stone
- 15:00 – 16:00** IEEE Std 43 - Testing Insulation Resistance of Rotating Machinery
Carlyle *Chair: Andy Brown*
- 16:00 – 18:00** IEEE Std 304 - Evaluation and Classification of Insulation Systems for
Carlyle Direct-Current Machines
Chair: Bal Gupta
- 16:00 – 18:00** IEEE Std 117 - Evaluation of Systems for Insulating Materials for
Scott A Random-Wound AC Electrical Machinery
Chair: Nancy Frost

Wednesday, June 14, 2006

- 08:00 – 09:00** IEEE Std 286 - Measurement of Power Factor and Power Factor Tip-
Windsor up of Rotating Machinery Stator Coil Insulation
Chair: Tim Emery
- 09:00 – 10:00** IEEE Std 275 - Thermal Evaluation of Insulated Systems for
Windsor Alternating Current Electric Machinery Employing Form Wound Pre-
insulated Stator Coils for Machines Rated 6,900V and Below
Chair: Chuck Wilson
- 10:00 – 11:00** IEEE Std 429 - Thermal Evaluation of Sealed Insulated Systems for
Windsor AC Electric Machinery Employing Form Wound Pre-insulated Stator
Coils for Machines Rated 6,900V and Below
Chair: Chuck Wilson
- 13:30 – 17:00** Materials Subcommittee
Windsor
- 13:00 – 18:00** AdComm Meeting
Carlyle

SHORT COURSES

Fee: \$300 (members), **\$320** (non-members) **\$150** (students)

Course 1: Introduction to Electrical Insulation for Non-Engineers

Instructors: Dr. Nancy Frost and Kevin Alewine of Von Roll Isola USA Inc.

Abstract: The focus of this course is the basic aspects of insulation materials for the novice. The fundamental aspects of insulation materials will be covered, including how to select materials and how to test performance.

The course covers the properties of the various types of insulation, with an emphasis on materials used in commercial and industrial products, ranging from low to high voltage (over 2300 V) and up to high temperature ($\geq 155^{\circ}\text{C}$) applications. We will also review the major test methods and standards used in selecting and qualifying insulation systems. Also covered in the course is an introduction to electricity at the basic and introductory level as well as insulation materials and the areas where they are utilized (transformers, motors, generators).

Who Should Attend: This course would appeal to both technical and non-technical personnel who require a fundamental working knowledge of electrical insulation systems. This would include marketing and sales managers, including senior managers and product managers and other non-engineers who need to understand the basics of electrical insulation systems. Entry level engineers with limited experience in insulation materials would also be interested in this course.

Instructor Biographies:

Kevin Alewine, in the Technical Marketing Department with Von Roll Isola USA, has been involved in resin and varnish sales, applications and marketing for more than 30 years. Kevin is heavily involved in insulating liquids training and applications support work at Von Roll. Kevin has organized or participated in several workshops and seminars in the industry.

Nancy Frost, Ph.D. joined Von Roll Isola USA in 2002 as a Dielectrics Engineer. Nancy's education includes a B.S. in Chemistry and M.S. & PhD in Electrical Engineering. She has published technical papers in conferences regularly for the past 10 years and has given over 30 presentations on insulation materials. She is also very active in the IEEE Standards Working Groups and the IEEE Dielectrics and Electrical Insulation Society.

Schedule: 6 hours - Sunday, 11 June 2006

Scott A, 9:00am – 16:00pm

Course 2: Classification of Electric Fields and Field Dependent Behavior of Dielectrics

Instructor: Ravindra Arora, Department of Electrical Engineering, Indian Institute of Technology, Kanpur, India

Course Contents

- Electric stress in dielectrics, classification of electric fields, Schwaiger factor and its relevance to the design of electrical apparatus. Distortions in electric fields due to space charge and grounding. Streamer Mechanism.
- Field dependent breakdown strength of dielectrics in uniform and weakly non uniform fields. Transition from weakly to extremely non uniform fields. Limiting values of Schwaiger factor in air and SF₆ gas.
- Types of stable Partial Breakdown (PB) in gaseous dielectrics (Coronas). Identification of their sources by EMI measurements, a tool for condition monitoring.
- Dependence of breakdown strength of gaseous dielectrics in extremely non uniform fields on stable partial breakdown phenomenon preceding the breakdown. Effect of the type and polarity of voltages on the breakdown strength of dielectrics in extremely non uniform fields.

Schedule: 6 hours - Sunday, 11 June 2006

Scott B, 9:00am – 16:00pm

Course 3: Failure Testing and Reliability Assessment of Electrical Systems

Instructor: Dr Nigel Hampton, National Electrical Engineering Test Research and Application Centre (NEETRAC), Georgia Institute of Technology, Atlanta

Course Content: Touching on

- Data collection and conditioning
- Distribution Based Methods
- Distribution Free Methods
- Endurance and Defined Time testing
- Datamining - digging nuggets of golden information out of the mud
- Dealing with Dirty Data
- Recognising Improvements and assessing whether they are real
- Techniques to reduce the time or size of tests

The course will be a mixture of presentations and guided worked examples for the participants to undertake.

Instructor Biography:

Dr. Nigel Hampton received his bachelor and doctorate degrees in physics from the University of Bath. In 1988, Dr. Hampton joined the R & D laboratories of BICC Cables Ltd., located in North Wales where he worked on LV & MV systems. In 1991, Dr. Hampton joined the Supertension Cable business of BICC Cables south east of London. Over the next nine years, he worked within the HV & EHV cable business, building a number of world respected research programs. During this period, he pursued interests in the fields of HVDC, cable accessories, XLPE cables, applied statistics, and life analysis. Between 2001-06, Dr. Hampton was responsible for managing the power cable application within Borealis AB in Sweden. Dr. Hampton joined Georgia Tech in 2006 where he serves as the Chief Materials Scientist at the National Electric Energy Testing Research and Applications Center. At NEETRAC, he develops and manages a variety of projects related to the high field dielectric and performance characteristics of materials used in all parts of the electric utility industry.

Schedule: 6 hours - Sunday, 11 June 2006
Windsor, 9:00am – 16:00pm

TECHNICAL PROGRAM

SUNDAY, 11 JUNE 2006

- 08:00 – 17:00 REGISTRATION
Churchill Court
- 19:00 – 21:00 WELCOME RECEPTION
Churchill Ballroom

MONDAY, 12 JUNE 2006

- 07:00 – 17:00 REGISTRATION:
- 07:00 – 08:00 CONTINENTAL BREAKFAST
Churchill Court
- Breakfast - Wren Room
Monday Oral Presenters and Session Chairs
- 08:00 – 08:10 WELCOME BY SYMPOSIUM CHAIR
H. G. SEDDING
- 08:10 – 09:00 ADDRESS BY 2006 DAKIN AWARDEE
- 09:00 – 09:30 Coffee Break

SESSION 1: MACHINES (Oral)

Churchill Ballroom A, 09:30 – 12:25

Session Chair: Doug Conley, Siemens Power Generation, Inc, USA

- 09:30 – **Keynote Address:**
10:20 **Class F at Class B Temperatures: Is it Time for a Change?**
David J Wallis, RWEpower, Swindon, United Kingdom
- 10:20 – **Partial Discharge Diagnosis of Stator Insulation Using Damped AC Voltages**
10:45 E. Gulski, S. Meijer, Delft University of Technology, Delft, The Netherlands, H.J. van Breen, NUON Assetmanagement, Arnhem, The Netherlands, P.P. Seitz, Seitz Instruments AG, Niederrohrdorf, Switzerland, F. de Vries, NUON Tecno, Alkmaar, The Netherlands, F. Petzold, SebaKMT, Baunach, Germany
- 10:45 – **Modeling of a Generator I-V Curve from the Ramped Direct Voltage Method**
11:10 E. David, Abdelkader Nair, École de Technologie Supérieure, Quebec, Canada, T. Godin, J. Bellemare, Hydro-Québec, Quebec, Canada
- 11:10 – **A Simple Method to Electrically Determine the Limits of Conductive/Non Conductive Parts of a Stator Bar**
11:35 A. Petit, Electricité de France – DTG, Grenoble, France, O. Lesaint, LEMD, CNRS and Joseph Fourier Grenoble University, Grenoble, France
- 11:35 – **Investigation of Insulation Failures in Two Old Hydro Power Plants in Iran**
12:00 M. R Naghashan, Power and Water University of Technology, Tehran, Iran

12:00 – Thermal Endurance Testing of Rotor Turn Insulating Materials
12:25 D. Manns, GE Consumer & Industrial, Large Motors & Generators, Ontario, Canada

SESSION 2 – CABLES-1 (Oral)

Churchill Ballroom B, 09:30 – 12:00

Session Chair: Harry Orton, Orton Consulting Engineering International, Canada

09:30 – Keynote Address:
10:20 Effect of Size on Electrical Performance
R.N Hampton*, A Smedberg, DF Wald, Borealis AB, Stenungsund, Sweden (*now at GA Tech NEETRAC, USA)

10:20 – PD Pulse Propagation in Shielded Power Cable for Symmetric and Asymmetric
10:45 PD Pulses
S. Boggs, Institute of Materials Science, University of Connecticut, Connecticut, USA,
N. Oussalah, Y. Zebboudj, High Voltage Laboratory, University A.M. of Bejaia, Bejaia,
Algeria

10:45 – Detection of Manufacturing Defects in Polymeric Cable Joint Insulation using X-
11:10 rays
A.P. Robinson, P.L. Lewin, S.G. Swingler, University of Southampton, Southampton,
UK

11:10 – Insulating System Characterisation of High Temperature Superconductor Flat
11:35 Cables
F.Guastavino, G.Coletti, E.Torello, University of Genova, Italy, R.Brambilla, L.Martini,
CESI Ricerca, Milano, Italy

11:35 – Recent Experiences with On-Line PD Testing of MV XLPE and EPR Cable
12:00 M. Fenger, H. Sedding, Kinectrics Inc., Ontario, Canada

SESSION 3 – OUTDOOR INSULATION -1 (Oral)

Rossetti Room, 09:30 – 12:00

Session Chair: Tony Carreira – K-Line Insulators Limited, Canada

09:30 – Keynote Address:
10:20 Corona Testing of 765-kV Insulator Assemblies Using the Voltage Gradient
Method
J. Kuffel, Z. Li, Kinectrics Inc, Ontario, Canada, B. Freimark, T. Rao, American Electric
Power, Ohio, USA

10:20 – Direct relationship between breakdown strength and tracking index of
10:45 composites
S.F. Madsen, J. Holbøll and M. Henriksen, Ørsted DTU, Electric Power Engineering,
Denmark

10:45 – Insulation Effects and Characteristics of XLPE Covered Overhead Conductors
11:10 in Low and Medium Voltage Power Distribution Systems in Iran
F. Shahnai, K.R. Milani, Eastern Azarbayjan Electric Power Distribution Company,
Tabriz, Iran, A.M. Kashtiban, M.T. Haque, University of Tabriz, Tabriz, Iran

11:10 – Electric Field Distribution along the Surface of High Voltage Polymer Insulators
11:35 and its Changes under Service Conditions
A.L. Souza, I.J.S. Lopes, Federal Univ of Minas Gerais, Belo Horizonte, MG Brazil

11:35 – 12:00 The Analysis of Surface Degradation Mechanism on Epoxy/Glass Fiber Used for Outdoor Insulator

Gu-Bum Park, Jae-Ho Yuk, Yuhan College, Gyeonggi-do, Korea, Kyung-Bum Lim, Korea Fire Safety Association, Gyeonggi-do, Korea, Do-Hyun You, Ansan College of Technology, Gyeonggi-do, Korea, Myung-Hwan Hwang, Incheon University, Gyeonggi-do, Korea

12:00 – 14:00 Lunch

SESSION 4 – TRANSFORMERS -1 (Oral)

Churchill Ballroom A, 14:00 – 17:15

Session Chair: Jitka Fuhr - ABB, Switzerland

14:00 – Keynote Address:

14:50 Mineral Insulating Oils; Functional Requirements, Specifications and Production

M. Eklund, Nynas Naphthenics AB, Nynashamn, Sweden

14:50 – 15:15 Response of Capacitive Couplers on a Generating Unit to Various Sources of Partial Discharge

W. McDermid, J.C. Bromley, T. Black, Manitoba Hydro, Manitoba, Canada

15:15 – 15:40 A Novel Optical Diagnostic Tool for Condition Assessment of Insulation Oils

L. Hosier, A. S. Vaughan, University of Southampton, UK
S. J. Sutton- National Grid, Warwick, UK

15:40 – 16:00 Coffee Break

16:00 – New Properties of “Old” Transformer Materials

16:25 I. Höhle, P. Heinzig, Wolfgang Knorr, Siemens AG, Transformers Germany, Nuremberg, Germany, R. Asano, Siemens Ltda, Jundiai, Brasil

16:25 – 16:50 High Speed Catastrophic Events in Technical Insulating Liquids

A. Jaksts, G. Blanchet, ABB AB, Corporate Research, Västerås, Sweden

16:50 – 17:15 An Experiment to Evaluate the Benefits of Processing Aged Transformer Oil

P.M. Mitchinson, I. L. Hosier, P. L. Lewin, A. S. Vaughan, G. C Chen, University of Southampton, UK, P Jarman, National Grid, Warwick, UK

SESSION 5 – LIFE ASSESSMENT (ORAL)

Churchill Ballroom B, 14:00 – 16:25

Session Chair: Greg Stone – Iris Power LP, Canada

14:00 – 14:25 On-site PD Diagnosis of Transmission Power Cables

E. Gulski, J.J. Smit, S. Meijer, Delft University of Technology, Delft, The Netherlands, P.P. Seitz, Seitz Instruments AG, Niederrohrdorf, Switzerland, E.R.S. Groot, Nuon Tecno, Alkmaar, The Netherlands

14:25 – 14:50 Condition Assessment Study on Stator Bars, After 40 Years of Operation

C. Wendel, C.E. Stephan, C. Picech, G. Csaba, ALSTOM (Switzerland) Ltd, Birr, Switzerland

- 14:50 – Searching for Indexes Suitable for Rotating Machines Diagnosis**
15:15 A.Contin, DEEI, Università di Trieste, Trieste, Italy
A. Cavallini, G. C. Montanari, DIE-LIMAT, Università di Bologna, Bologna, Italy,
C.Hudon, M.Bélec, IREQ, Hydro-Québec, Québec, Canada, D.N.Nguyen, Hydro-
Québec, Québec, Canada
- 15:15 – Extension of Generator Lifetime by Winding Renewal**
15:40 C. Sumereder, R. Woschitz, M. Muhr, Graz University of Technology, Austria, H.
Egger, M. Marketz, Kelag, Austria

15:40 – 16:00 Coffee Break

- 16:00 – Comparison of Support Vector Machine Based Partial Discharge Identification**
16:25 Parameters
L. Hao, P.L. Lewin and S.J. Dodd, The Tony Davies High Voltage Laboratory,
University of Southampton, Southampton, UK

SESSION 6 – OUTDOOR INSULATION -2 (Oral)

Rossetti Room, 14:00 – 16:50

Session Chair: Ed Cherney, University of Waterloo, Canada

- 14:00 – A Novel Approach for the Inference of Insulator Pollution Severity**
14:25 A. Cavallini, G.C. Montanari, S. Chandrasekar, DIE/LIMAT, University of Bologna,
Bologna, Italy, F. Puletti, TechImp Spa, Zola Predosa (Bo), Italy
- 14:25 – Failure Characteristics of Suspension-Type Porcelain Insulators on a 154kV**
14:50 Transmission Line
Se-Won Han, Han-Goo Cho, Advanced Electric Material Group, KERI, Korea, In-Hyuk
Choi, Dong-Il Lee Transmission Group, KEPRI, Korea
- 14:50 – Statistical Analysis of Partial Discharge Data**
15:15 M. Bélec, C. Hudon, IREQ, Hydro-Québec, Québec, Canada
D.N. Nguyen, Hydro-Québec, Québec, Canada
- 15:15 – Evaluation of the Insulation of 15 kV – 25 kV Feeders and Procedures for**
15:40 Substitution of Damaged Units
H. R. P. M. de Oliveira, F. Pelizan, AES Sul - Distribuidora Gaúcha de Energia,
Brazil., I. G. Campos Jr., C. Lefort, C. de Salles, M. L. B. Martinez, R. G. de Oliveira
Jr., Universidade Federal de Itajubá, Brazil.

15:40 – 16:00 Coffee Break

- 16:00 – Online Detecting Composite Insulators By Two Dimensions Electric Field**
16:25 Distribution
Yangchun Cheng, North China Electric Power University, Beijing, China, Chengrong
Li, Beijing KeyLaboratory of High Voltage and EMC, Beijing, China
- 16:25 – Performance of 400 kV Line Insulators Under Pollution**
16:50 R. Arora, M. Rai, S. Kumar Yadav, Indian Institute of Technology, KANPUR-India

SESSION 7 - POSTER

Churchill Ballroom A & B, 19:00 – 21:00

Session Chair – Machines: Don Campbell, US Army Corps of Eng, USA

- 7-1 Understanding the Economic Cost Impact of Ground Wall Reduction in 13,800v AC Induction Motors**
J. Williams, Electrolock Inc., Ohio, USA
- 7-2 Aging Characterization of Medium Voltage Groundwall Insulation Intended for PWM Applications**
S. Ul-Haq, S.H. Jayaram, E.A. Cherney, University of Waterloo, Ontario, Canada
- 7-3 PD Measurements During the Degradation of Twisted Pair Enameled Wires Subjected to Repetitive Voltage Impulses**
F. Guastavino, A. Dardano, A. Ratto, E. Torello, Università degli Studi di Genova, Genova, Italy
- 7-4 The System Architecture of Selective Frequency Balance Measurement for PD**
Liu Gang, South China University of Technology, Guangdong, P. R. China, Wu Guangning, Southwest Jiaotong University, Sichuan, P. R. China, Tu Demin, Xi'an Jiaotong University, Sichuan, P. R. China
- 7-5 3D Analysis and Calculation of Stator Temperature Field of Hydrogenerator in the Case of Sudden Short Circuit**
Fan Yadong, Wen Xishan, Xu Shaohua, Deng Wei, Wuhan University, Wuhan, China
- 7-6 Aging Time Effect on PD and Space Charge Behavior in Magnet Wire Under High PWM Voltages**
Kai Zhou, Guanning Wu, Tao Deng, Jiandong Wu, Southwest Jiaotong University, Sichuan, China
- 7-7 Design of Digital Acquisition System for Partial Discharge of Power Equipment**
Peng Wang, Guangning Wu, Bo Gao, Jun Guo, Southwest Jiaotong University, Chengdu, China
- 7-8 High Frequency Behavior of AC Machine: Application of Turn Insulation Aging Diagnostic**
Frédéric Perisse, Piotr Werynski, Daniel Roger, LSEE Université d'Artois, Technoparc Futura, 62400 Béthune, France

Session Chair – Cables: Soli Bamji, National Research Council of Canada, Canada

- 7-9 Comparison of Electroluminescence of Different High Voltage Cable Materials under Identical Experimental Conditions**
A. Mohd Ariffin, P.L. Lewin, S.J. Dodd, The Tony Davies High Voltage Laboratory, University of Southampton, Southampton, UK
- 7-10 Control of Water Tree Length and Density in Cable Insulation Polyethylenes**
F. Ciuprina, Politehnica University of Bucharest, ELMAT, Bucharest, Romania, G. Teissédre, J. Filippini, LEMD – CNRS/UJF, Grenoble, France, N. Hampton*, Annika Smedberg and Alfred Campus, Borealis AB, Sweden (*presently at Georgia Tech, NEETRAC, USA)
- 7-11 An Experimental Study About the Fire Resistance of Low Voltage Cables**
F. Guastavino, G. Coletti, A. Ratto, E. Torello, University of Genova, Genova, Italy, P.

Michelato, INFN-LASA, Milano, Italy, M. Celentano, A. Zucchelli, Cavicel S.p.a., Pioltello (Mi), Italy

- 7-12 Impact of Rheological Properties on Conductor Shield Convolutions in Power Cables from a Continuous Vulcanization Process**
Suh Joon Han, Scott H. Wasserman, The Dow Chemical Company, New Jersey, USA
- 7-13 Electrical and Mechanical Properties of Semi-Conductive Sheath Materials Aged at High Temperatures in Seawater**
S. Hvidsten, G. Vegge, J.T. Benjaminsen, SINTEF Energy Research, Trondheim, Norway
- 7-14 Electric Field Computation in Water Treed Polyethylene with Space Charge Accumulation**
C. Stancu, P.V. Notinger, F. Ciuprina, Politehnica University of Bucharest, ELMAT, Bucharest, Romania, P. Notinger jr, S. Agnel, J. Castellon, A. Toureille, Laboratoire d'Electrotechnique de Montpellier, Université Montpellier, France

Session Chair – Outdoor Insulation: Stephen Sebo, Ohio State Univ, USA

- 7-15 The TSC Characteristics of HTV Composite Insulators**
Ying Liang, Lijian Ding, C. R. Li, Kun Yang, North China Electric Power University, Beijing, China
- 7-16 A Cold Fog Test Method of Composite Insulators**
Linjie Zhao, Chengrong Li, Jisha Yao, Shuqi Zhang, Jun Xiong, North China Electric Power University, Beijing, China
- 7-17 Evaluation of Electrical Insulation Properties on Aged Composite Insulators in Heavily Contaminated Areas**
Haifeng Gao, Zhicheng Guan, Yingke Mao, Zhidong Jia, Liming Wang, Tsinghua University, Guangdong, P. R. China, Keneng Zhu, Tianjin Electric Power Research Institute, Tianjin, P. R. China
- 7-18 Research on Electric Potential Distributions of Composite Insulators and Glass Insulators by Numerical Simulation**
Fan Yadong, Wen Xishan, Deng Wei, Li Xiaoping, Wuhan University, Wuhan, China

Session Chair – Transformers: Jeff Tennant, Ontario Power Gen, Canada

- 7-19 Case Study of ANSI Standard Delta-Wye Distribution Transformer**
M.T. Al-Hajri, Saudi Aramco, Dhahran, Saudi Arabia
- 7-20 Influence of the Electrodes Coating with Thin Layers on the Dielectric Strength of Transformer Oils**
A. Beroual, Ecole Centrale de Lyon, Centre de Génie Electrique de Lyon, Ecully Cedex, France, J. Fleszynski, Wroclaw University of Technology, Wroclaw, Poland
- 7-21 Thermal Model for Power Transformers Dynamic Loading**
A. Elmoudi, M. Lehtonen, Helsinki University of Technology, Espoo, Finland, H. Nordman, ABB Transformers, Vaasa, Finland
- 7-22 An Experiment for Evaluating the Scale Effect of Moisture on High Voltage Transformer Insulation**
P. M. Mitchinson, P. L. Lewin, G. C Chen, University of Southampton, Southampton, UK, P. Jarman, National Grid, Warwick, UK

- 7-23 Analysis of Semiconductor Sensor for Detecting Dissolved Gases in Power Transformers**
Lijun Zhou, Guangning Wu, Chong Su, Hongliang Wang, Hao Tang, Shenglin Li, Southwest Jiaotong University, Sichuan, China
- 7-24 Modelling of Oil-Paper Insulation Layers in the Frequency Domain with Cole-Cole-Functions**
D. Giselbrecht, T. Leibfried, University of Karlsruhe, Germany
- Session Chair – Partial Discharge:** Andy Brown, Kinectrics Inc, Canada
- 7-25 An Experiment Study of Partial Discharge Pattern Recognition Method Based on Wavelet Neural Networks**
Dian-chun Zheng, Chun-xi Zhang, Guo-qing Yang, Harbin Univ. Sci. & Tech., Harbin, China, Xue-yong Sun, Jiangxi Electric Power Design Institute, Jiangxi, Nanchang, China
- 7-26 The Influence of Mobile Signal in UHF PD Monitoring and Our Solving**
Wei Wang(B), Chengrong Li, Wei Wang(A), Bin Zheng, Guiqian Zhao, North China Electric Power University, Beijing, China
- 7-27 Comparisons of Discrete Wavelet Transform, Wavelet Packet Transform and Stationary Wavelet Transform in Denoising PD Measurement Data**
X. Zhou, C. Zhou, and B.G. Stewart, Glasgow Caledonian University, Glasgow, UK
- 7-28 Influence of Impulse Frequency on Partial Discharge under PWM**
Xi Liu, Guangning Wu, Laisheng Tong, Tongguang Lin, Guoqin Zhang, Southwest Jiaotong University, Chengdu, China
- Session Chair – Materials:** Dan Manns, GE Canada
- 7-29 Electrical Insulation Material Parameters and Power Electronic Waveform Environment**
V. Mentlik, P. Trnka, P. Prosr, J. Pihera, R. Polansky, University of West Bohemia in Pilsen, Plzen, Czech Republic
- 7-30 Measurement of Resistive and Absorption Currents in Capacitor Films up to Breakdown**
Chunchuan Xu, S. Boggs, Institute of Materials Science, University of Connecticut, Connecticut, USA
- 7-31 Investigation of Heat-of-Fusion Heat Sinks for Polymer-Type Metal Oxide Surge Arresters**
Z. Zheng, University of Toronto, Ontario, Canada, T. Imai, S. Sakaguchi, Y. Kasuga, Toshiba Corporation of Japan, Kawasaki, Japan, S. Boggs, University of Connecticut, Connecticut, USA
- 7-32 A Study on Space Charge Dynamics in Ultra Thin Aluminum-oxide Barrier Layer of TMR Heads**
Yue Liu, Moris Dovek, PoKang Wang, Headway Technologies Inc., California, USA
- 7-33 Radiation Effects on Electrical and Mechanical Properties of LDPE/EVA Blends**
Chung Lee, Ki-Yup Kim, Korea Atomic Energy Research Institute, Daejeon, Korea, Boo-Hyung Ryu, Dongguk University, Kyeongju, Korea

- 7-34 Nonlinear Properties of ZnO Ceramics as a Function of Threshold. Voltage and Fraction of Nonconducting Grains**
M.R. Meshkatoddini, S. Abbaspour University of Technology, Tehran, Iran (Currently with the University of Toronto), S. Boggs, University of Toronto, Ontario, Canada
- 7-35 What is “Nano” in the Context of a Filled Dielectric?**
A. L. An, S.A. Boggs, University of Connecticut, Connecticut, USA
- 7-36 Absorption Current vs. Charge Voltage for Industrial Quality Capacitors**
Xiaoguang Qi, Steven Boggs, Institute of Materials Science, Department of Physics, University of Connecticut, USA

TUESDAY, JUNE 13, 2006

07:00 – 17:00 REGISTRATION

07:00 – 08:30 CONTINENTAL BREAKFAST
Churchill Court

Breakfast - Wren Room
Tuesday Oral Presenters and Session Chairs

SESSION 8 - PARTIAL DISCHARGES (ORAL)

Churchill Ballroom A, 08:30 – 12:10

Session Chairs: Hugh Zhu, Powertech Labs, Canada
Lori Rux, US Army Corps of Engineers, USA

- 08:30 – 09:20** **Keynote Address:**
Partial discharge measurements: becoming a fundamental tool for quality control and risk assessment of electrical systems?
G. C. Montanari, University of Bologna, Bologna, Italy
- 09:20 – 09:45** **Partial Discharge Measurements for a Twisted Pair of Insulated Conductors at Low Pressures in Air, Argon and Helium**
X. Liu, D. G. Kasten, S. A. Sebo, The Ohio State University, Ohio, USA, D. F. Grosjean, Innovative Scientific Solutions, ISSI, Ohio, USA, D. L. Schweickart, Air Force Research Laboratory, WPAFB, Ohio, USA
- 09:45 – 10:10** **Statistical Time Distribution of Partial Discharges under Semi-Square Voltages**
E. Lindell, J. Blennow, Chalmers University of Technology, Gothenburg, Sweden, T. Bengtsson-ABB Corporate Research, Västerås, Sweden
- 10:10 – 10:30** **Coffee Break**
- 10:30 – 10:55** **Enhanced Partial Discharge De-Noising Technique Using Eigen-Decomposition**
T. K. Abdel-Galil, King Fahd University Petroleum and Minerals, Dhahran, Saudi Arabia, A. H. El-Hag, M. M. A. Salama, R. Bartnikas, University of Waterloo, Ontario, Canada
- 10:55 – 11:20** **The Influence of the Stress Time Duration on the Partial Discharge Behavior in Cast Resin Insulation**
R. Victoria, L.E. Gockenbach, H. Borsi, Schering Institut, University of Hannover, Hannover, Germany

- 11:20 – **Classification of Partial Discharge Signals by Means of Auto-Correlation Function Evaluation**
11:45
A. Contin, S. Pastore, D.E.E.I. University of Trieste, Trieste, Italy
- 11:45 – **Partial Discharge Impulse Behaviour in Different Insulating Media**
12:10
R. Schwarz, M. Muhr, S. Jaufer, Graz University of Technology, Graz, Austria

SESSION 9 – GIS, Capacitors, & Switching Phenomena (Oral)

Rossetti, 08:30 – 12:10

Session Chairs: Noboru Fujimoto – Kinectrics Inc, Canada
Jody Levine – Kinectrics Inc, Canada
Clive Reed – Consultant, USA
Yang Cao – GE Global Research, Canada

- 08:30 – **Keynote Address:**
09:20 **Managing High Short Circuit Current in Generating Power Plants and Substations**
Sever Bodea, ABB Inc., Ontario, Canada
- 09:20 – **Effect of UV Treatment on the Dielectric Strength of BOPP Capacitor Film**
09:45
J. Ho, S. Boggs, University of Connecticut, Connecticut, USA
- 09:45 – **Investigation of the Influence of Different Parameters on Electric Field in a Distribution Surge Arrester**
10:10
M.R.Meshkatoddini, S. Abbaspour University of Technology, Tehran, Iran
- 10:10 – 10:30 **Coffee Break**
- 10:30 – **Research on Transmission Line System Simulation Models with Line Arresters and its Application**
10:55
X. Ren, G. Wu, L. Fu, Z. Li, Southwest Jiaotong University, Sichuan, China
- 10:55 – **Efficiency of Film Capacitors in Forced Electrothermal Modes**
11:20
O.A. Emelyanov, Saint - Petersburg State Polytechnical University, Russia
- 11:20 – **Detecting Instrument for DC Partial Discharge within Storage Capacitor**
11:35
Y. Qu, G. Wu, X. Zhang, X. Li, W. Shu, Southwest Jiaotong University, Chengdu, China
- 11:45 – **Insulation Performance of Permittivity Graded FGM (Functionally Graded Materials) in SF₆ Gas under Lightning Impulse Conditions**
12:10
H. Okubo, H. Shumiya, M. Ito, K. Kato, Nagoya University, Nagoya, Japan

SESSION 10 - MACHINES -2 (ORAL)

Churchill Ballroom B, 08:30am – 10:15

Session Chair: Glenn Mottershead, Voith Siemens Power Gen, Canada

- 08:30 – **Condition Assessment of Rotating Machine Winding Insulation by Analysis of Charging and Discharging Currents**
08:55
G.R. Soltani, E. David, École de Technologie Supérieure, Quebec, Canada
- 08:55 – **Performance of Calcined and Uncalcined VPI Mica Tapes for High Voltage AC Stator Winding Insulation**
09:20

R. Omranipour, M. K. W. Stranges, F. A. Plummer, J. E. Hayward, General Electric
Canada, Ontario, Canada

09:20 – Experience with Thermal Cycling of Stator Coils and Bars
09:45 W. McDermid, Manitoba Hydro, Manitoba, Canada

09:45 – Class H Insulation System for Rotating Equipment
10:10 H. Brandes, T. Hillmer, Von Roll Switzerland Ltd, Breitenbach, Switzerland, N. Frost,
Von Roll Isola, Inc., New York, USA, A. Mesrobian, National Oilwell Varco, Texas,
USA

10:10 – 10:30 Coffee Break

SESSION 11 MATERIALS -1 (Oral)

Churchill Ballroom B, 10:30 – 12:35

Session Chair: Steve Boggs, University of Connecticut, USA

10:30 – Phase Resolved PEA Technique to Measure Space Charge Distribution in
10:55 Polymeric Insulation
S.S. Bamji, M. Abou Dakka and A. Bulinski, Institute for National Measurement
Standards, NRC Canada, Ontario, Canada

10:55 – Development of Cryogenic Electrical Insulation Using Bamboo Pulp-Ice
11:20 Composite System
Y. Shiji, Y. Muramoto, N. Shimizu, Meijo University, Nagoya, Japan

11:20 – Simulation of High Field Resistive and Absorption Currents in Semicrystalline
11:45 Polymer Films
C. Xu, S.A. Boggs, University of Connecticut, Connecticut, USA, Z. Zheng, University
of Toronto, Ontario, Canada

11:45 – Discrepancies of PD Patterns from a Fixed Metal Object on Oil-Paper Insulation
12:10 D. Guo, D. M. Hepburn, A. Nesbitt, C. Zhou, X. Zhou, Glasgow Caledonian University,
Glasgow, UK

12:10 – The Monitoring of Property Changes in Insulating Materials Containing Silicone
12:35 Binder
V. Mentlík, R. Polanský, J. Pihera, P. Prosr, P. Trnka, University of West Bohemia,
Pilsen, Czech Republic

12:10 – 14:00 Lunch

SESSION 12 – MACHINES – 3 (ORAL)

Churchill Ballroom A, 14:00 – 17:15

Session Chairs: Doug Conley, Siemens Power Generation Inc., USA
Glenn Mottershead, Voith Siemens Power Generation, Canada

14:00 – Investigations Into the Use of Temperature Detectors as Stator Winding Partial
14:25 Discharge Detectors
S.R. Campbell, G.C. Stone, Iris Power, Ontario, Canada

14:25 – New Generation of Conductive Tapes for High Voltage Applications
14:50 H. Brandes, T. Hillmer, Von Roll Switzerland Ltd, Breitenbach, Switzerland, M.R.

Levit, W.E. Corbett, E. I. du Pont de Nemours and Company, Virginia, USA, N.E.
Frost, Von Roll Isola, Inc., New York, USA

14:50 – Study of Stress Grading Systems Working Under Fast Rise Time Pulses
15:15 F. P. Espino-Cortes, University of Waterloo and ESIME-Zacatenco National Polytechnic Institute, Mexico, Y. Montasser, S. H. Jayaram, E. A. Cherney, University of Waterloo, Ontario, Canada

15:15 – 15:35 Coffee Break

15:35 – Quality Evaluation of Stator Coils and Bars under Thermal Cycling Stress
16:00 H. Zhu, C. Morton, Powertech Labs, British Columbia, Canada, S. Cherukupalli, BC Hydro, British Columbia, Canada

16:00 – Partial Discharge – A Valuable Stator Winding Evaluation Tool
16:25 C.V. Maughan, Maughan Engineering Consultants, New York, USA

16:25 – Applications of Insulation Resistance and High Direct Voltage Ramp Tests to the Assessment of Insulation Systems of Hydrogenerator Stator Bars and Coils
16:50 B. Gronowski, General Electric Canada, GE Infrastructure – Energy – Power Generation Technology, Ontario, Canada

16:50 – Partial Discharge Erosion of Nano-Filled Enameled Wires Subjected to High Frequency Waveforms
17:15 S. Ul Haq, Shesha H. Jayaram, Edward A. Cherney and L. C. Simon, University of Waterloo, Ontario, Canada

SESSION 13 TRANSFORMERS -2 (ORAL)

Churchill Ballroom B, 14:00 – 17:15

Session Chair: Mark Fenger, Kinectrics Inc, Canada

14:00 – Corrosive Sulphur in Mineral Oils: Its Detection and Correlated Transformer Failures
14:25 V. Tumiatti, R. Maina, Sea Marcony Technologies, Collegno, Italy, F. Scatiggio, Terna Spa, Venezia, Italy, M. Pompili, University of Roma, La Sapienza, Italy, R. Bartnikas, Institut de Recherche d'Hydro-Quebec, Quebec, Canada

14:25 – The Aging Characteristics of Laminated Pressboard and Laminated Wood in Oil Cooled Power Transformers
14:50 H. P. Gasser, C. Krause, Weidmann Transformerboard Systems AG, Rapperswil, Switzerland, T.A. Prevost, EHV Weidmann Industries, Vermont, USA

14:50 – Effect of Harmonics on Transformers Loss of life
15:15 A.Elmoudi, M. Lehtonen, Helsinki University of Technology, Espoo, Finland, H. Nordman, ABB Transformers, Vaasa, Finland

15:15 – 15:35 Coffee Break

15:35 – Application of Electro-optic Modulation Technique for PD Monitoring of Power Transformers
16:00 L. Hao, P.L. Lewin, Y. Tian, J.S. Wilkinson, S.G. Swingler, University of Southampton, UK, S.J. Sutton, National Grid Transco, Warwick, UK

16:00 – Application of UHF Diagnostics to Detect PD During Power Transformer Acceptance Tests
16:25

S. Meijer, P.D. Agoris, J.J. Smit, Delft University of Technology, Delft, The Netherlands, M.D. Judd, L. Yang, University of Strathclyde, Glasgow, Scotland

16:25 – A Universal High-Voltage Source Based on a Static Frequency Converter
16:50 F. Martin, T. Leibfried, University of Karlsruhe (IEH), Karlsruhe, Germany

16:50 – PD-Source Localization in the Insulating System of Large Power Transformers
17:15 J. Fuhr, ABB Business Area Power Transformers, Spiez, Switzerland

SESSION 14 –CABLES -2 (ORAL)

Rossetti Room, 14:00 – 15:15

Session Chair: John Densley, ArborLec Inc, Canada

14:00 – Predicting Lead Sheath Cable Failures

14:25 V.J. Ammirato, J. Silecchia, W. Fairechio, Consolidated Edison of New York, New York, USA

14:25 – Experience from On-Site Condition Assessment of XLPE MV Cables

14:50 J. Skjøberg, S. Hvidsten, H. Farneo, SINTEF Energy Research, Trondheim, Norway

14:50 – Practical Experiences in on-site PD Diagnosis Tests of HV Power Cable Accessories in Service

15:15 E. Lemke and T. Strehl, Lemke Diagnostics GmbH, Volkersdorf/Dresden, Germany, W. Weissenberg, Brugg Kabel AG, Brugg, Switzerland, J. Herron, HV Technologies Inc., Virginia, USA

15:15 – 15:35 Coffee Break

SESSION 15 –MEASUREMENTS (ORAL)

Rossetti Room, 15:35pm – 17:15 pm

Session Chair: Gary Heuston, Doble Engineering Company, USA

15:35 – Improvement of the Test Method for Insulating Oils

16:00 W. Lick, G. J. Pukel, M. Muhr, Graz University of Technology, Graz/Austria

16:00 – Combined high frequency and high voltage insulation system investigation

16:25 M. Nagel, C. Herold, T. Wenzel, T. Leibfried, Universität Karlsruhe (TH) – IEH, Karlsruhe, Germany

16:25 – A Nanosecond High Voltage Pulse Generator for Measuring Space Charge Distribution

16:50 T. Deng, G. Wu, K. Zhou, J. Wu, Southwest Jiaotong University, Sichuan, China

16:50 – The Curing Classifier of Dielectrics Based on Epoxy Resins

17:15 V. Mentlik, J. Pihera, R. Polansky, P. Prosr, P. Trnka, University of West Bohemia, Pilsen, Czech Republic

18:30 – 21:00 CONFERENCE AWARDS BANQUET
Mountbatten Salon

WEDNESDAY, JUNE 14, 2006

07:30 – 08:30 CONTINENTAL BREAKFAST
Churchill Court

Breakfast - Wren Room
Wednesday Oral Presenters and Session Chairs

SESSION 16 - NANOMATERIALS (ORAL)

Churchill Ballroom A, 08:30 – 11:45

Session Chair: Pat Irwin - GE Global Research Center, USA

08:30 – Keynote Address:

09:20 The Promise of Dielectric Nanocomposites

J. Keith Nelson, Rensselaer Polytechnic Institute, New York, USA

09:20 – The Emerging Field of Nanodielectrics: An Annotated Appreciation

09:45 M. F. Fréchette, Institut de recherche d'Hydro-Québec, Québec, Canada, C. W. Reed, Consultant, New York, USA

09:45 – Energy Storage in Polymer Films with High Dielectric Constant Fillers

10:10 A. L. An, S.A. Boggs, University of Connecticut, Connecticut, USA, J. Calame, Naval Research Laboratory, Washington, D.C. USA

10:10 – 10:30 Coffee Break

10:30 – The Effect of Electrical field on the Slow Polarization of Nano-SiO_x and Low-density Polyethylene Composite

10:55 Zhe Li, Yi Yin and Xiaobing Dong, Shanghai Jiao Tong University, Shanghai, China

10:55 – Use of Nano-Silica in Silicone Rubber for Ceramic Insulators Coatings in Coastal Areas

11:20 L.H. Meyer, S.H.L. Cabral, E. Araújo, G. Cardoso, N. Liesenfeld, University of Blumenau, Blumenau, SC, Brazil

11:20 – A Study About Electrical Treeing in Different EVA-Layered Silicate Nanostructured Compounds

11:45 F. Guastavino, A. Dardano, Università degli Studi di Genova, Genova, Italy, G.C. Montanari, Università di Bologna, Bologna, Italy, F. Deorsola, Politecnico di Torino, Torino, Italy, M. Di Lorenzo del Casale, Università di Palermo, Palermo, Italy

SESSION 17 – CABLES -3 (ORAL)

Churchill Ballroom B, 08:30 – 12:10

Session Chairs: John Densley, ArborLec Inc., Canada

Harry Orton, Orton Consulting Engineering International, Canada

08:30 – Condition Assessment of Power Cable Accessories using Advanced VHF/UHF PD detection

08:55 S. Meijer, P.D. Agoris, E. Gulski, Delft University of Technology, Delft, The Netherlands, P.P. Seitz, Seitz Instruments AG, Niederrohrdorf, Switzerland, T.J.W.H. Hermans, Lawrence Lamballais, Prysmian Cables and Systems B.V., Delft, The Netherlands

08:55 – 09:20 **The Study on Evaluation Model for Prefabricated HV Stress Cone of Cable Termination's Weaknesses Based on Finite Element**
Liu Gang, Wang Chao, South China University of Technology, Guangdong, P. R. China, Liu Yigang, Yi Zepei, Guangzhou Power Supply Bureau of Guangdong Power Grid Corporation, Guangdong, P. R. China

09:20 – 09:45 **A Comparison between 2-D Isothermal Region Matrix and Finite Element Analysis Cable Rating Methods for Water Cooled Circuits**
D.J. Swaffield, P.L. Lewin, University of Southampton, Southampton, UK, M. LeBlanc, S. Sutton, National Grid Transco, Warwick, Warwickshire, UK

09:45 – 10:10 **Considerations of Conduction Mechanism of LDPE under Ac High Field**
K. Tohyama, Numazu National College of Technology, Numazu, Japan, Y. Murata, J-Power Systems, Ibaraki-ken, Japan, M. Nagao, Toyohashi University of Technology, Tempaku, Toyohashi, Japan

10:10 – 10:30 **Coffee Break**

10:30 – 10:55 **Electrical Treeing Caused by Rapid DC-Voltage Grounding of XLPE Cable Insulation**
M. Selsjord, SINTEF Energy Research, Trondheim, Norway
E. Ildstad, Norwegian University of Science and Technology (NTNU), Trondheim, Norway

10:55 – 11:20 **Modeling of Stress-Enhancement at defects Inside Cable Insulation**
T. J. Person, The Dow Chemical Company, New Jersey, USA, K. Yang and J. Jiang, The Dow Chemical Company, Michigan, USA

11:20 – 11:45 **Laboratory Results from Dielectric Spectroscopy of Field Aged XLPE Cables with Respect to Water Trees**
K. Pedersen, J. Holboell, M. Henriksen, Ørsted DTU, Technical University of Denmark, Lyngby, Denmark, H. Sedding, M. Fenger, Kinectrics Inc., Ontario, Canada

11:45 – 12:10 **Condensation of Water Vapour in XLPE Insulation at Different Cooling Rates and Pressures**
Ø.L.Hestad, S. Hvidsten, SINTEF Energy Research, Trondheim, Norway

SESSION 18 – MATERIALS -2 (ORAL)

Rossetti Room, 08:30 – 10:10

Session Chair: Shesha Jayaram, Universtiy of Waterloo, Canada

08:30 – 08:55 **Optimization Techniques on Permittivity Distribution in Permittivity Graded Solid Insulators**
H. Okubo, H. Shumiya, M. Ito, K. Kato, Nagoya University, Nagoya, Japan

08:55 – 09:20 **The Effect of Temperature Gradient on the Dielectric Properties of Insulating Fluids**
I. Fofana, Université du Québec à Chicoutimi, Québec, Canada.
V. Wasserberg, H. Borsi, E. Gockenbach, Schering- Institute, University of Hanover, Germany

09:20 - 09:45 **Deterioration of Internal Interfaces between Silicone and Epoxy Resin**
J. Andersson, S.M. Gubanski, Chalmers University of Technology, Göteborg, Sweden, H. Hillborg, ABB Corporate Research, Västerås, Sweden

09:45 – Degradation of LDPE Containing Antioxidants by Gamma-Irradiation
10:10 Chung Lee, Ki-Yup Kim, Korea Atomic Energy Research Institute, Daejeon, Korea,
Boo-Hyung Ryu, Dongguk University, Kyeongju, Korea

10:10 – 10:30 Coffee Break

SESSION 19 – TRANSFORMERS -3 (ORAL)

Rossetti Room, 10:30 – 12:35

Session Chairs: Mark Fenger, Kinectrics Inc, Canada
Jitka Fuhr, ABB, Switzerland

10:30 – New Synthetic Ester Fluid for the Insulation of Liquid Immersed Transformers

10:55 B. Dolata, H. Borsi, E. Gockenbach, Schering- Institute, University of Hanover,
Germany, V. Wasserberg, Consultant, Hannover, Germany, H. Baehr, COGNIS
Synlubes, Dusseldorf, Germany

10:55 – Dielectric Strength of Oil-Paper-Insulation Under Transient Voltage Stress

11:20 M. Rösner, F. Hofmann, AREVA Energietechnik, Mönchengladbach, Germany, A.
Schnettler, Institute for High Voltage Technology, Aachen, Germany

**11:20 – Partial Discharge Pattern Analysis of Modeled Insulation Defects in Transformer
Insulation**

11:45 F. Massingue, S. Meijer, P.D. Agoris, J.J. Smit, Delft University of Technology, The
Netherlands, J. Lopez-Roldan, Pauwels Trafo Belgium N.V., Mechelen, Belgium

11:45 – On-line Diagnostics of Power Transformers

12:10 V. Mentlik, P. Prosr, J. Pihera, R. Polanský, P. Trnka, University of West Bohemia,
Pilsen, Czech Republic

**12:10 – The Effect of Oiling the Insulation of Power Transformers on the Efficiency of
the Final Vacuum Cycle**

12:35 C. Krause, H.P. Gasser, Weidmann Transformerboard Systems AG, Rapperswil,
Switzerland

END OF SYMPOSIUM

This page will have a layout of the hotel's 2nd and 3rd floors showing the rooms that we will be using.

