ADVANCE TECHNICAL PROGRAMME

PowerAfrica 2007

PROGRAMME

16 – 20 July 2007

University of the Witwatersrand,
Johannesburg
South Africa

Founding Chair of PowerAfrica

Dr. Hans Bjorn Püttgen

"As the PES membership continues to grow outside of North America, it behooves us to better serve our international constituency. At the core of this strategy is to enhance the PES presence around the world by way of meetings organized in close collaboration with local organizations. In 2005, we experienced our first foray into the southern hemisphere part of Africa. I am particularly pleased that we have been able to organize this event in close collaboration with the South African Institute of Electrical Engineers, our sister society here in South Africa, with the Southern African Power Pool, which groups the major electric utilities of twelve countries in the region, and also with the University of KwaZulu Natal (in 2005) and with the University of the Witwatersrand, Johannesburg (in 2007). This combined support of professional societies, industry and academia is emblematic of the type of coalitions we seek to work with."

Co-chairs for PowerAfrica 2007

Pat Naidoo

Senior General Manager
Office of the Chief Executive
Eskom Holdings Limited
South Africa

Ian Jandrell

Head of the School of Electrical and Information Engineering
University of the Witwatersrand
Johannesburg
South Africa

Ian McKechnie
President
South African Institute of Electrical Engineers
Observatory, Johannesburg
South Africa

Lawrence Musaba
Managing Director
Southern African Power Pool
Harare, Zimbabwe

CONFERENCE and EXPOSITION CHAIRS

Ian Jandrell
Local Organising Committee
University of the Witwatersrand,
Johannesburg
South Africa

Ron Harley
Technical Programme Committee
Georgia Institute of Technology
Atlanta
United States of America

Johan Enslin
Panel Design and Preparation
KEMA Inc
United States of America

Dido Diseko
Tutorial Design and Preparation
Eskom Holdings Limited
South Africa

Membership of the Organizing Committee

Johannesburg
Ian Jandrell (Chair)
John van Coller
Pat Naidoo
Gavin Bruce
Sidwell Mtetwa
Dido Diseko
Ken Nixon
Willie Cronje
Thavi Govender
James Braid
Sheilagh Koen
Bongi Ntuli
John Gosling
Tony Britten
Gary Sibilant
Emmanuel Lubini
Dhevan Pillay
Marshall Prosothma and Team of Y-Land Publications
Estelle le Roux of Events Consultants
Nelson Ijumba and Neetu Raman of HVDC Centre, UKZN

Atlanta, USA
Ron Harley (Technical Chair)

Raleigh, USA
Johan Enslin (Panel Sessions Organizer)

IEEE New York, USA
Bob Dent
Patrick Ryan

POWER ENGINEERING AFRICA TOWARDS and BEYOND 100 GW

The Conference will focus on innovative techniques and the application of new technologies that will cover all aspects of renewable energy development, large scale and peaking power generation, HVDC and HVAC transmission, distribution technologies, customer utilization and efficiencies, including automation, instrumentation, control, power electronics, machines, and quality of supply.

The Conference is structured into the following four main areas:

- Renewable Energy Development and Power Generation
- HVAC, FACTS and HVDC economical bulk power transmission
- Distribution Technologies, Customer Utilization, Energy Efficiency and Quality of Supply
- Industrial Power Supply, Automation, Power Electronics, Instrumentation, Telecommunications in Power Engineering, Controls and Machines.

The conference will be supported by an exposition; Southern African Power Pool member country exhibits showing investment opportunities and OEM supplier exhibits in support of the technology as outlined in each of the above areas. Members of the Southern African Power Pool include South Africa, Botswana, Lesotho, Swaziland, Mozambique, Zimbabwe, Namibia, Zambia, Malawi, Tanzania, Angola and the Democratic Republic of Congo; including the IPP Hydro Electric Cahora Bassa, the Mozambique Transmission Company (Motraco) and the recently launched Westcor for the Inga 3 development. The Conference will provide a valuable forum for member utilities, member countries and other African Power Pools to prepare exhibits that demonstrate forward electricity plans and investment opportunities. Local and international manufacturers are invited to show their technology that will support the African Engineering Renaissance. There will also be opportunities to network with the best in the world.

IEEE Tutorials, student posters, technical visits and companion tours will complete the packaging of this world-class IEEE PES second biannual event in Africa.

EACH DAY AT A GLANCE FROM JULY 14 TO JULY 22

All panel and paper sessions are held in the New Commerce Building (NCB) and all tutorials are held in the Chamber of Mines Building (COM) – see map.

July 14 Saturday	July 15 Sunday	July 16 Monday	July 17 Tuesday	July 18 Wednesday	July 19 Thursday	July 20 Friday	July 21 Saturday	July 22 Sunday
09:00 Pre Conference Tour Departs Sunnyside Park Hotel		07:00 Registration in the Exhibition (Flower) Hall	07:30 Registration in the Exhibition (Flower) Hall	07:30 Registration in the Exhibition (Flower) Hall	08:00 Registration in the Exhibition (Flower) Hall	08:00 Registration in the Exhibition (Flower) Hall	09:00 Post Conference Tour Departs Sunnyside Park Hotel	
		10:00 Opening Plenary Session – Wits Great Hall			08;00 – 12;00 Tutorial T1 Tutorial T2 Tutorial T3	07:30 – 11:00 Tutorial T7 Tutorial T8		
Visiting Eskom Drakensberg Power Station Under Construction - Braamhoek Power Station			08:30-12:30 Technical sessions	08:30-12:00 Technical sessions			Visiting Eskom Kendal Thermal Power Station Under Refurbishment - Apollo 533 kV DC Converter Station	
		13:00- 14:30 Lunch in the Exhibition (Flower) Hall	***12:30- 14:00 Lunch in the Exhibition (Flower) Hall***	***12:00- 13:00 Lunch in the Exhibition (Flower) Hall***	***12:00- 13:00 Lunch in the Exhibition (Flower Hall)***	***11:00 – 11:30 Lunch in the Exhibition (Flower Hall***		
		14:30-18:00 Technical sessions	14:00-17:30 Technical sessions	13:00-15:30 Technical sessions	13:00-17:00 Tutorial T4 Tutorial T5 Tutorial T6	11:30 – 15:00 Tutorial T9 Tutorial T10		
	16:00 Pre Conference Tour Returns Sunnyside Park Hotel			15:30 ***Closing Plenary session – NCB1***				16:00 Post Conference Tour Returns Sunnyside Park Hotel
		18:00 – 20:00 ***Light dinner in the Exhibition (Flower) Hall***	**18:00 – 20:00** ***Light dinner in the Exhibition (Flower) Hall***					

Lunches and dinners are held in the Exhibition (Flower) Hall.

The Exhibition is open the whole week.

Programme

Saturday July 14, 2007

Pre Conference Technical Tour for Members and Companions

(see www.ewh.ieee/conf/powerafrica for registration details)

Weekend 14-15 July 2007

A visit to the Drakensberg Pump Storage Power Station, 1000 MW power station situated in the mountains and having 400 kV GIS, with overnight stay in the chilly Drakensberg Mountains along with roaring fireplaces and South African red wine; A World Heritage site and an unforgettable experience awaits members and companions. Also included is a visit to the under construction Braamhoek Pumped Storage Power Station.

09:00 **Pre Conference Tour Departs Sunnyside Park Hotel**

Sunday July 15, 2007

15:00 **Pre Conference Tour Returns Sunnyside Park Hotel**

Monday July 16, 2007
REGISTRATION – EXHIBITION (FLOWER) HALL

07:00 **Registration Opens in the Exhibition (Flower) Hall**

Teas, coffees and snacks available all day, all week in the Exhibition (Flower) Hall.

Monday July 16, 2007

SESSION 1: OPENING PLENARY SESSION - GREAT HALL

10:00 Plenary Session in the Great Hall; all delegates to be seated by 10:10.

Master of Ceremonies: Professor Ian Jandrell, University of Witwatersrand

10:15 Entry and Assembly of Honoured Guests

Founding Chair of IEEE PES PowerAfrica: Dr Hans (Teddy) Bjorg Püttgen
Co-Chair of PowerAfrica 2007: Mr. Pat Naidoo
President of the IEEE PES, Mr John McDonald
Executive Director of IEEE PES, Mr Patrick Ryan
Chairman of the LOC for PowerAfrica 2007: Professor Ian Jandrell
Chairman of the TC for PowerAfrica 2007: Professor Ron Harley
Deputy Vice Chancellor (Research) of the University of the Witwatersrand, Johannesburg: Professor Belinda Bozzoli
Dean of the Faculty of Engineering and the Built Environment of the University of the Witwatersrand, Johannesburg: Professor Bea Lacquet
Chairman of the Southern African Power Pool Executive Committee: Mr. Manuel Caumbe
Managing Director of the Southern African Power Pool: Dr Lawrence Musaba
President of the South African Institute of Electrical Engineers: Mr Ian McKechnie
Chief Executive of Eskom Holdings Limited South Africa: Mr Jacob Maroga

10:20 Introduction of Honoured Guests – Master of Ceremonies: Prof. Ian Jandrell

10:30 Welcome to Wits – Deputy Vice Chancellor (Research) of the University of the Witwatersrand, Johannesburg: Prof. Belinda Bozzoli

10:40 Presidential Address – Mr. John McDonald

11:00 Welcome address: Founding Chair of PowerAfrica, Prof. Hans (Teddy) Püttgen

11:15 Welcome to Southern Africa: Managing Director of SAPP: Dr Lawrence Musaba

11:30 Welcome Message: President of the SAIEE: Mr Ian McKechnie

11:40 Keynote Address - Mr. Jacob Maroga: Chief Executive of Eskom Holdings.

Eskom South Africa, the Powerhouse of Africa, has contributed in delivering an improved quality of life for its entire people during the first decade of democracy. Building on the vast and large scale electrification of households, farms and new industries, South Africa accelerates forward and the economic growth pushes demand towards supply capability. Eskom responds and prepares large scale capital investments to meet and exceed customer expectations whilst encouraging energy efficient application of the most economic resources.

12:00 Technical Program Chair: Prof. Ron Harley

12:30 Opening of Exhibition Hall and Student Posters

Student posters will be judged during the lunch breaks on Monday and Tuesday.

13:00 Lunch is served in the Exhibition (Flower) Hall

Monday July 16, 2007 PANEL and PAPER SESSIONS - NEW COMMERCE BUILDING

MONDAY AFTERNOON: 14:30 – 18:00

14:30 Session 2.1 Panel Session 1

Room: New Commerce Building 1 (NCB1)

CHAIR and Organizer:- Johan Enslin (KEMA Inc. Consulting, USA)

Has the time for "Super Power Grids" arrived?

Moderator:- Aty Edris, *EPRI, USA*

China, India and South Africa are moving ahead with both UHV and HVDC Super Power Grid planning and implementation. Europe and the USA are increasingly applying HVDC and FACTS in cross-linking important major grid and sub-grid elements on a macro-scale, taking into account additionally the particular issues of renewable generation, such as wind power. Are the related technologies mature enough, including network power management and automation systems, to expect a broadening of these trends also in Southern Africa, or is this more specific to the Asian regions?

Panel Subjects & Panelists:

- **Wide Area Monitoring, Protection and Control Systems (WAMPAC) in Modern Power Grids**
  Damir Novosel, *Infrasource, Inc., USA*

- **Interconnection of Renewable Energy to Super Power Grids,**
  Dennis Woodford, *Electranix, Canada*

- **800 kV HVDC for Transmission of Large Amount of Power over very Long Distances**
  Bo Westman, *ABB. Sweden*

- **{Title to be announced}**
  Dietmar Retzmann, *Siemens, Germany*

- **Development Status of ± 800 kV HVDC Links**
  Johan Enslin, *KEMA Inc. USA*

- **Coordinated Control of Multiple HVDC systems for damping interarea oscillations in CSG** (formal paper)
  Li Licheng, Wu Xiaochen, Li Peng, *China Southern Power Grid Company, Ltd, China*

14:30 Session 2.2 Electrical Machines

Room: New Commerce Building 2 (NCB2)

Chair: Wiehan le Roux, *University of Pretoria, South Africa*

14:30 **The use of an electromagnetic finite elements package to aid in understanding shaft voltages in a synchronous generator**
Daniel de Canha, Willie Cronje, Alan Meyer , *University of the Witwatersrand, South Africa*
Simon John Hoffe, *Altech UEC, South Africa*

15:00 **Design and Analysis of a Double-Sided Tubular Linear Synchronous Generator with Particular Application to Wave-Energy Conversion**
Danson Joseph, Willie Cronje, *University of the Witwatersrand, South Africa*

15:30 **Design of a Portable Hand Crank Generating System to Power Remote Off-Grid Communities**
Long Wu, Aristidis Zachas, Ronald G. Harley, Thomas G. Habetler, Deepakraj M. Divan, *Georgia Institute of Technology, USA*

16:00-16:30 Coffee/Tea break

16:30 **Comparison of Standards for Determining Losses and Efficiency of Three-Phase Induction Motors**
Heskin Mzungu, Mohamed Azeem Khan, Pragasen Pillay, Ben Sebitosi, *University of Cape Town, South Africa*

17:00 **Electrical Power Flow Spectral Analysis relating to Vibration in a Large Electromechanical System**
Christopher Lines, *University of the Witwatersrand, Johann, South Africa*
Peter Warner, *Anglo Technical Division, South Africa*

17:30 **Loading Capability of Transformer in Over-excitation Condition**
Mehdi Savaghebi, Ahmad Gholami, Hossein Hooshyar, *Iran University of Science and Technology, Iran*

14:30 Session 2.3 Quality of Supply

Room: New Commerce Building 3 (NCB3)

Chair: Robert Koch, *Eskom, South Africa*

14:30 **Applying a New Simulated Annealing Algorithm to Control the THDV and Solve Continuous Problems**
Soheil Ghadami, Maryam Shokoufi Moghiman, *Bou Ali Sina University, Iran*

15:00 **An Online Method of Extracting Single Event Sag Indices**
Raj Naidoo, *University of Pretoria, South Africa*
Pragasen Pillay, *Clarkson University, USA*

15:30 **Management of Voltage Dips for Large Industrial Customers**
Ulrich Minnaar, Andrew Sprunt, Thinus Du Plessis, Robert Koch, Dharmesh Bhana, *Eskom, South Africa*

16:00-16:30 Coffee/Tea break

16:30 **Flicker Propagation in Interconnected Power Systems**
Sankika Tennakoon, Sarath Perera, Danny Sutanto, *University of Wollongong, Australia*

17:00 **Analysis of System Asymmetry of Interconnected 66kV Sub-transmission Systems in relation to Voltage Unbalance**
Prabodha Paranavithana, Sarath Perera, Danny Sutanto, *University of Wollongong, Australia*

14:30 Session 2.4 Protection I

Room: New Commerce Building 4 (NCB4)

Chair: Bruce Rigby, *University of KwaZulu Natal, South Africa*

14:30 **Transient Polarity Comparison for Integrated Protection of Distribution Network**
Zhiqian Bo, *AREVA T&D Automation, UK*
Jinghan He, *Beijing Jiaotong University, China*
Xinzhou Dong, *Tsinghua University, China*
Ben Caunce, Andrew Klimek, *AREVA T&D Automation, UK*

15:00 **Power Transformer Transient Based Protection Using Wavelet De-Noising**
Zaojun Ou, Jinghan He, *Beijing Jiaotong University, China*
Zhiqian Bo, Andrew Klimek, *AREVA T&D Automation, UK*

15:30 **Fault Classification in Distribution Power Lines Based on Magnetic Field Measurement and Fourier Transform**
Seyed Alireza Davari, Mohammad Shahrtash, *Iran University of Science and Technology, Iran*

16:00-16:30 Coffee/Tea break

16:30 **Proper Dimension of HTS Material for a Resistive Type SFCL in an 11kV Distribution System**
Hossein Heydari, Hossein Hooshyar, Mehdi Savaghebi, Reza Sharifi, *Iran University of Science and Technology, Iran*

17:00 **Harmonics Consideration of a Resistive Type Superconducting Fault Current Limiter**
Hossein Heydari, Hossein Hooshyar, Mehdi Savaghebi, Reza Sharifi, *Iran University of Science and Technology, Iran*

17:30 **Feature Extraction of High Impedance Arcing Faults in Compensated MV Networks. Part I: DWT-Based Analysis of Phase Quantities**
Nagy Elkalashy, Matti Lehtonen, *Helsinki University of Technology, Finland*
Hatem Darwish, Abdel-Maksoud Taalab, Mohamed Izzularab, *Minoufiya University, Egypt*

18:00 Dinner in the Exhibition (Flower) Hall

Student posters to remain on display at least until Tuesday evening.

Tuesday 17 July 2007: 09:00-17:00 IEEE PES TUTORIAL FOR NON ENGINEERS – CHAMBER OF MINES CM1

Tuesday July 17, 2007 PANEL and PAPER SESSIONS - NEW COMMERCE BUILDING

08:30-12:30 Session 3.1 Panel Session 2

Room: New Commerce Building 1 (NCB1)

CHAIR and Organizer:- Johan Enslin (KEMA Inc. Consulting, USA)

Asset Management and Aging Infrastructure: Costs, cures and contradictions of an ageing infrastructure and workforce.

Moderator:- Damir Novosel, *InfraSource*

How do we manage our increasingly older systems while at the same time, increasing reliability, actively extending new infrastructure and service provision? How can we plan, design, build, operate and maintain this aging infrastructure with an aging workforce?

Invited Presentations:

- **"Asset Management of Large Power Transformers in Eskom, South Africa",** Pat Naidoo, *ESKOM.*
- **"Techniques to Improve Asset Availability",** Dr. Peter Reichmeider, *Quanta Services.*

Paper Presentations:

On Distribution Asset Management: Development of Replacement Strategies
Miroslav Begovic, Joshua Perkel, Nigel Hampton, Rick Hartlein, *Georgia Institute of Technology, USA*

10:00 Coffee/Tea break

Asset Health Reviews to Manage Remaining Life
Alan Wilson, *Doble PowerTest Ltd, UK*
John Lapworth, *Doble Engineering Company, UK*

Control Practices Contribute To Premature Transformer Failures
Erwin T. Jauch, *Beckwith Electric Company, Inc., USA*

Protection and substation automation systems: standardization, integration and information technology
Ivan de Mesmaeker, Claes Rytoft, Petra Reinhardt, *ABB, Switzerland*

08:30 Session 3.2 HVDC and HVAC Transmission I

Room: New Commerce Building 2 (NCB2)

Chair: Nelson Ijumba, *University of KwaZulu Natal, South Africa*

08:30 **HVDC Strengthening in Southern Africa**
Paul Tuson, Naas Burger, *PB Power Africa, South Africa*
Ronald Marais, *Eskom, South Africa*

09:00 **Feasibility of Increased Power Imports via Apollo Songo HVDC Scheme**
Nhlanhla Mbuli, *Eskom, South Africa*

09:30 **Potential Applications and Network Considerations for an Emerging Technology – High Voltage Direct Current (HVDC) Technology in Africa**
Irma Emmanuel Lubini, *Eskom, South Africa*

10:00 Coffee/Tea break

10:30 **DC and AC Side Harmonics in CCC Converters**
Luis Carlos Origa De Oliveira, Wilson Martins Borges, Julio Borges De Souza, *University of São Paulo State, Brazil*

11:00 **A Study of Laser Generated Plasmas and Their Application to High Voltage Engineering**
Nicholas John West, Ian Robert Jandrell, *University of the Witwatersrand, South Africa*

11:30 **A FACTS-Based Power Flow Controller Model for the IEEE SSR First Benchmark Model**

Rudy Pillay Carpanen, Bruce Rigby, *University of KwaZulu-Natal, South Africa*

08:30 Session 3.3 Power System Analysis I

Room: New Commerce Building 3 (NCB3)

Chair: John van Coller, *University of the Witwatersrand, South Africa*

08:30 **A Generation Reserve Optimization Model Incorporating Demand Market Participation**
Pieter Smit, Raj Naidoo, Vijan Naidoo, *University of Pretoria, South Africa*

09:00 **A New Partitioned Algorithm of Innovation Graph Technique**
Yanjun Zhang, *Harbin Institute of Technology, China*

09:30 **A Generalized Power Flow Method to Assess Steady-State Equilibrium of Power Systems**
Igor Kopcak, Luiz Carlos Pereira Da Silva, Vivaldo Fernando Da Costa, *University of Campinas, Brazil*

10:00 *Coffee/Tea break*

10:30 **Covered-Conductor Overhead Distribution Line Modeling and Experimental Verification for Determining Its Line Characteristics**
Ghulam Murtaza Hashmi, Matti Lehtonen, *Helsinki University of Technology, Finland*

11:00 **Simulation of Nonlinear Elements within the Framework of Time Domain**
Seyed Hossein Hosseinian, Behrooz Vahidi, *Amirkabir University of Technology, Iran*

11:30 **Allocation of Transmission Loss Cost with Traceable Flow Method in Power System Network**
Hassan Siahkali, *Sharif University of Technology, Iran*

08:30 Session 3.4 Protection II

Room: New Commerce Building 4 (NCB4)

Chair: Ian Jandrell, *University of the Witwatersrand, South Africa*

08:30 **Comparison of the Lightning Risk Profile for Different Types of Structures with Incoming Power Services**
Andrew Dickson, Ian Jandrell, John Van Coller, *University of the Witwatersrand, Johannesburg, South Africa*

09:00 **Automated Real-Time Simulator Testing of Protection Relays**
Bruce Rigby, *University of KwaZulu-Natal, South Africa*

09:30 **A Dynamic Fault Current Limiter (DFCL)**
Hubert Rubenbauer, *University Erlangen-Nuremberg, Germany*

10:00 Coffee/Tea break

10:30 **Feature Extraction of High Impedance Arcing Faults in Compensated MV Networks. Part II: DWT-Based Analysis of Residual Components**
Nagy Elkalashy, Matti Lehtonen, *Helsinki University of Technology, Finland*
Hatem Darwish, Abdel-Maksoud Taalab, Mohamed Izzularab, *Minoufiya University, Egypt*
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11:00 **A Hybrid Strategy for Distributed Generators Islanding Detection**
Mohamed Ezzat, Mohamed Abdel-Rahman, Mostafa Marei, Mohamed Mansour, *Ain Shams University, Egypt*

12:30 Lunch Served in the Exhibition (Flower) Hall

TUESDAY AFTERNOON SESSIONS: 14:00 – 18:00

14:00 Session 4.1 Renewable Energy

Room: New Commerce Building 1 (NCB1)

Chair: Komla Folly, *University of Cape Town, South Africa*

14:00 **Intelligent Optimal Control of Wind Power Generating System by a Complemented Linear Quadratic Gaussian Approach**
Endusa Billy Muhando, Tomonobu Senjyu, Naomitsu Urasaki, Hiroshi Kinjo, *University of the Ryukyus, Japan*

14:30 **Interconnecting Large-Scale Wind Power to Transmission Networks**
Johan Enslin, *KEMA Inc., USA*
Pavol Bauer, *Delft University of Technology, The Netherlands*

15:00 **An Integrated Design Approach for Small Grid-tied Permanent Magnet Wind Generators**
Mohamed Azeem Khan, *University of Cape Town, South Africa*
Sibel Zorlu, Rui Guan, Pragasen Pillay, Ken Visser, *Clarkson University, USA*

15:30-16:00 Coffee/Tea break

16:00 **Standards and Technical Guidelines for the Interconnection of Renewable Energy Sources into the Grid (Distribution Networks)**
Taru Madangombe, Komla Folly, Prag Pillay, *University of Cape Town, South Africa*

14:00 Session 4.2 HVDC and HVAC Transmission II

Room: New Commerce Building 2 (NCB2)

Chair: Irma Emmanuel Lubini, *Eskom, South Africa*

14:00 **A Novel Approach to Providing on Route Power Supplies to Rural and Urban Communities in Close Proximity to the Extra High Voltage DC Transmission Line**
Gunnar Asplund, Andrew Williamson, Bo Westman, *ABB Power Systems, Sweden*

14:30 **Geophysical and geological pre-investigations for HVDC-electrodes**
Hans Tunehag, *GeoVista, Sweden*
Urban Åström, Bo Westman, *ABB Power Systems, Sweden*

15:00 **A Study of Bird Streamer Initiated Breakdown Characteristics under HVDC Conditions**
Nelson M Ijumba, Kribashen Naidoo, *UZKN,* Anthony C Britten, *Eskom, South Africa*

15:30-16:00 Coffee/Tea break

16:00 **A Comparative Study of Space Charge Effects on Corona Current Using an Indoor Corona Cage and a Monopolar TestLine**
Mokwape J Lekganyane, Nelson M Ijumba, *University of Kwazulu-Natal, South Africa*

16:30 **Study on the Key Equipment's Insulation Level of ±800kV UHVDC Power Transmission Project**
Lv Jinzhuang, Li Licheng, *China Southern Power Grid Company, Ltd, China*

14:00 Session 4.3 Power System Analysis II

Room: New Commerce Building 3 (NCB3)

Chair: To be named

14:00 **Robustness Evaluation Of H_ Power System Stabilizer**
K Mocwane, KA Folly, *University of Cape Town, RSA*

14:30 **Thermostatic Load Modeling**
Mohamed Abdel-Rahman, *Ain Shams University, Egypt*

15:00 **Optimization of the Efficiency of Aeolian Vibration Dampers**
Krispin Hans-Joerg, *RIBE Electrical Fittings, Germany*
Stephan Fuchs, Peter Hagedorn, *Technical University of Darmstadt, Germany*

15:30-16:00 Coffee/Tea break

16:00 **The Impedance Chart and its Application in Obtaining the Shape and Complex Plane Position of the Out-Of-Step Polygons**
Franco de Villiers, *Eskom, South Africa*
John van Coller, *University of the Witwatersrand, South Africa*

16:30 **The electrical demand by transport on the grid after oil depletion**
Johan Wolmarans, Braham Ferreira, *Technical University Delft, The Netherlands*

17:00 **Application of Weighted Structured Total Least Squares in Identification of Power System Oscillation Modes**
Rastko Zivanovic, *University of Adelaide, Australia*

14:00 Session 4.4 Computational Intelligence in Power I

Room: New Commerce Building 4 (NCB4)

Chair: Ganesh Kumar Venayagamoorthy, *University of MissouriRolla, USA*

14:00 **Intelligent Local and Hierarchical Control of FACTS Devices**
Salman Mohagheghi, *Georgia Institute of Technology, USA*
Ganesh K. Venayagamoorthy, *University of Missouri-Rolla, USA*
Ronald G. Harley, *Georgia Institute of Technology, USA*

14:30 **Angle Modulated Particle Swarm Optimization Based Islanding of Large Scale Power Systems**
Li Liu, Wenxin Liu, David Cartes, *Florida State University, USA*

15:00 **Identification of Induction Machines Stator Currents with Generalized Neurons**
Jing Huang, Ganesh Venayagamoorthy, Keith Corzine, *University of Missouri-Rolla, USA*

15:30-16:00 Coffee/Tea break

16:00 **Online Voltage Stability Monitoring and Contingency Ranking using RBF Neural Network**
Mohamad Reza Tousi, Seyed Hossein Hosseinian, Benyamin Moradzadeh,
Amirkabir University of Technology, Iran

16:30 **Heuristic-Guided Lagrangian Relaxation and Augmented La-grange Hopfield Network for Unit Commitment**
Vo Ngoc Dieu, Weerakorn Ongsakul, *Asian Institute of Technology, Thailand*

17:00 Dinner in the Exhibition (Flower) Hall

18:00 Student posters may be removed.

Wednesday 18 July 2007 PANEL and PAPER SESSIONS - NEW COMMERCE BUILDING

08:30 – 12:00 Session 5.1 Panel Session 1

Room: New Commerce Building 1 (NCB1)

CHAIR and Organizer:- Johan Enslin, *KEMA Inc. Consulting, USA*

What is a "Good" generation mix for the future?

Moderator:- Gideon Greyvensteyn, *PBMR, South Africa*

Is a nuclear renaissance on the horizon? Is large-scale wind and solar power generation reliable enough? Can we see a future for Clean Coal technologies? What is the current trend with storage integration? Is Distributed Power changing the focus away from bulk power generation? At a time of accelerating CO2 emissions and climate change, is Southern African electricity supply (and industry) going to be increasingly a positive or negative contributor? What role could SA play? How do we reconcile with shrinking reserve margins?

Generation options for South Africa – towards an appropriate mix

Global trends. Is large-scale wind and solar power generation feasible for RSA? What is the future role of nuclear? Can we see a future for Clean Coal technologies? What is the current trend with storage integration? How do we reconcile with shrinking reserve margins? At a time of accelerating CO_2 emissions and climate change, is Southern African electricity supply (and industry) going to be increasingly a positive or negative contributor? What role could SA play?

Speaker: Dr Steve Lennon, *Eskom.*

Nuclear Power: Sustainable generation option for the future?

Global tends, environmental impact of nuclear power, role of nuclear to reduce CO_2 emmissions, long term availability of uranium resources, sustainability and the closed fuel cycle, dealing with the waste problem, cost competitiveness, proliferation concerns, what percentage of the generation mix should be nuclear (the pro nuclear view)

Speaker:Prof Eben Mulder, *North-West University, South Africa.*

10:00 Coffee/Tea break

Prospects for Distributed Power Generation in RSA

The current status of and prospects for Distributed Generation; how Distributed Generation contributes to the nation's power supply; description of selected electricity generation technologies; economic considerations of distributed generation; the benefits and risks of distributed generation; potential savings in the production and delivery of electricity; additional savings from incentives for adjusting demand; potential benefits for the environment and

National security, barriers that impede widespread adoption of distributed generation, protecting the grid; interconnection requirements and costs; policy options, access to the grid - reducing technical, contractual and cost barriers.

Speaker: To be announced.

The role of PBMRs in RSA's future generation mix

What is the PBMR? Project status, PBMR's prospects for co-generation, PBMR's role in distributed generation, PBMR's share in RSA's future generation mix, PBMRs and the Supergrid

Speaker: Dr Adi Patterson, *PBMR, South Africa*.

08:30 Session 5.2a HVDC and HVAC Transmission III

Room: New Commerce Building 2 (NCB2)

Chair: Anthony C Britten, *Eskom, South Africa*

08:30 **Study on Pollution Flashover Characteristics of ±800kV DC Composite Insulators**
Luo Bing Lilicheng, Raohong Lixiaolin, *Technology Research Center of China Southern Power Grid Company, China*

09:00 **Study on Overload Capability and Its Application of HVDC Transmission System in China Southern Power Grid**
Xu Aidong, Wu Xiaochen, *Technology Research Center of China Southern Power Grid Company, China*

09:30 **Study on the Dynamic Performance of AC & DC Hybrid System in China Southern Power Grid**
Kaijian Ou, *Technology Research Center of China Southern Power Grid Company, China*

10:00 Coffee/Tea break

10:30 Session 5.2b Computational Intelligence in Power II

Room: New Commerce Building 2 (NCB2)

Chair: David Cartes, *Florida State University, USA*

10:30 **Application of Evolution Algorithm for Power System Controller Design**
Komla A Folly, *University of Cape Town, South Africa*

11:00 **A Fuzzy Technique for Voltage Control during Parallel Operation between In-plant Generation and Utility**
Ahmed Hegazy, *Engineering for petroleum and process industries Co., Egypt*
Yasser Galal, *Arab Academy for Science, Technology and Maritime Transport,Egypt, Egypt*

08:30 Session 5.3 Power System Planning I

Room: New Commerce Building 3 (NCB3)

Chair: Alison Chikova, *SAPP Co-Ordination Centre, South Africa*

08:30 **Eskom's New Coal-Fired Power Stations Programme, Case of Bravo Power Station Scheme: Transmission Integration (Feasibility Study)**
Cyril Shako T'Ulamba, *Eskom, South Africa*

09:00 **Energy Consumption Modeling in South Africa Correlated with the Income**
Willy Siti, *Tshwane University of Technology, South Africa*

09:30 **Exergy analysis for performance optimization of a steam turbine cycle**
Tapan K. Ray, *NTPC Limited, India*
Ranjan Ganguly, Amitava Gupta, *Jadavpur University, India*

10:00 Coffee/Tea break

10:30 **Important Parameters for Prediction of Power Loads - A Bottom-Up Approach Utilizing Measurements from an Automatic Meter Reading System**
Fredrik Wallin, Erik Dotzauer, Eva Thorin, Erik Dahlquist, *Mälardalen University, Sweden*

11:00 **Voltage sag source location: case study in Zambian grid**
Readlay Makaliki, *Zesco Limited, Zambia*
Roberto Leborgne, *Chalmers University of Technology, Sweden*

11:30 **Valuation of FACTS for Managing Congestion in Combined Pool and Bilateral Markets**
You Shi, Kennedy Mwanza, Tuan Le, *Chalmers University of Technology, Sweden*

08:30 Session 5.4 Power Electronics and Drives

Room: New Commerce Building 4 (NCB4)

Chair: Braham Ferreira, *Delft University of Technology, Netherlands, Netherlands*

08:30 **A Performance Evaluation of Shaped Planar Inductor Windings in Gapped Core Applications Utilizing Turns with Constant DC-Resistance**
Dawid Pentz, Ivan Hofsajer, *University of Johannesburg, South Africa*

09:00 **Novel Technique for Shaped Planar Inductor Winding Optimization in Gapped Core Applications**
Dawid Pentz, Ivan Hofsajer, *University of Johannesburg, South Africa*

09:30 **New Topology of Multi - Level - Converter with Optimised Pulse Sequencies**
Frank Grundmann, Jian Xie, *University of Ulm, Germany*

10:00 *Coffee/Tea break*

10:30 **Investigation of the Complexity Versus Performance of the DC Bus in a Voltage Fed Converter**
Emile Brink, Ivan Hofsajer, *University of Johannesburg, South Africa*

11:00 **Grid-Connected and Islanded Operation of a Hybrid Power System**
Y. Zhou, J. A. Ferreira, P. Bauer, *Delft University of Technology, Netherlands*

11:30 **The Analysis and Design of an Inter-Winding Shielding Structure of a High Frequency Transformer**
Angy Portolan, Ivan Hofsajer, *University of Johanesburg, South Africa*

12:00 Lunch Served in the Exhibition (Flower) Hall

13:00 Technical Conference Proceedings

13:00 Session 6.1 Automation, Instrumentation and Control

Room: New Commerce Building 1 (NCB1)

Chair: Richard Candy, *Eskom, South Africa*

13:00 **A Real-Time Simulator Study into the Performance of a Novel Voltage Regulator for On-Load Tap-Changing Transformers**
Thabo Modisane, Bruce Rigby, *University of KwaZulu-Natal, South Africa*

13:25 **Advanced Alarm Processing Facilities Installed on Eskom's Energy Management System**
Richard Candy, *Eskom – Transmission, South Africa*
Jacques Taisne, *AREVA T&D Energy Automation & Information Corporation, France*

13:50 **Changing the Tele-control Protocol to support Substation Based Intelligent Alarm Processing and Direct Control Staff Interaction with the Substation RTU/Gateway**
Richard Candy, *Eskom - System Operations, South Africa*

14:10 **Commissioning of an AMR Prototype System by PLC Technology**
Soodeh Haghgoo, *Central Branch of Azad University of Tehran, Iran*
Amir Seyedi, *Amirkabir University of Technology, Iran*

14:35 **Examining Power Line Communication on Egypt's Low Voltage Grid for AMR Network**
Ahmed Helmy, *Unionaire, Egypt*
Mohamed Abdel-Rahman, Mohamed Mansour, *Ain Shams University, Egypt*

15:00 **Monitoring Power Quality beyond EN 50160 and IEC 61000-4-30**
Amir Broshi, *Elspec Ltd., Iarael*

13:00 Session 6.2 Diagnostics

Room: New Commerce Building 2 (NCB2)

Chair: John Lapworth, *Doble PowerTest Ltd, UK*

13:00 **Acoustic and HF Detection of Defects on Porcelain Pin Insulators**
Cuthbert Nyamupangedengu, *University of the Witwatersrand, Johannesburg, South Africa*
Roy Macey, *Macey Electrical Technologies, South Africa*

13:25 **Using Cross-Correlation Coefficients to Analyze Transformer Sweep Frequency Response Analysis (SFRA) Traces**
G Mathiew Kennedy, Tony McGrail, *Doble Engineering Company, USA*

13:50 **Transformer Internal Over-Voltages Caused by Remote Energisation**
John Lapworth, *Doble PowerTest Ltd, UK*
G Mathiew Kennedy, *Doble Engineering Company, USA*

14:10 **Mitigation and Cure of Hot Spot Problem with a New Apparatus in Large Power Transformers and Analyzing by Ants Algorithm**
Kourosh Mousavi Takami, Jafar Mahmoudi, *IST dep., Mälardalen University, Sweden*

13:00 Session 6.3 Power System Planning II

Room: New Commerce Building 3 (NCB3)

Chair: Cyril Shako T'Ulamba, *Eskom, South Africa*

13:00 **Master Plan for the Electricity Distribution Network of Istanbul European Side**
Mahmut Erkut Cebeci, Osman Bulent Tor, Ulas Karaagac, Mufit Altin, Mevlut Akdeniz, *Middle East Technical University, Ankara, Turkey*

13:25 **Proposed Transformer Paralleling Guide for IEEE Transformer Committee**
Erwin T. Jauch, *Beckwith Electric Company, Inc., USA*

13:50 **Altruistic versus Profit Maximising System Operators of Rural Power Systems**
Al-Mas Sendegeya, *Makerere University, Uganda*
Mikael Amelin, Lennart Söder, *Royal Institute of Technology, Sweden*
Eriabu Lugujjo, Izael Da Silva, *Makerere University, Uganda*

14:10 **Proposed Ancillary Services for the Southern African Power Pool**
Graeme Chown, Jonathan Hedgecock, *Power Planning Associates, South Africa*
Alison Chikova, *SAPP Co-Ordination Centre, South Africa*
John Diya, *ZESA, South Africa*

14:35 **A Step by Step Method for Z-loop Construction Using Graph Theory and Topology for Power System under Faulted Studies**
Tedja Oepomo, *West LA, LA Harbor, Riverside Community Colleges, & ITT-Tech Institute Sykmar Campus, USA*

15:30 Closing Plenary: NCB1

Announcement of student poster prizes: Ian Jandrell

Launch of the Southern African IEEE PES Chapter
Teddy Püttgen

Announcement of PowerAfrica 2009: Teddy Püttgen

Message of Appreciation: John McDonald

Vote of Thanks and Closing Address:
Chairperson of the SAPP Management Committee and Managing Director of Lesotho Electricity Supply Commission:
Mr. Nathaniel Mapetwe

Thursday 19 July and Friday 20 July 2007 TUTORIALS - CHAMBER OF MINES BUILDING

Tutorial Schedule:

Tutorial Rooms:
CM1 - Chamber of Mines building basement
CM2 - Chamber of Mines building basement
CM5 - Chamber of Mines building basement

T1	Swarm Intelligence for Power Systems (Prof. GK Venayagamoorthy and Prof. RG Harley, USA)	Thur, 19 July	8:00 to 12:00	CM5
T2	1000 kV AC Technology (Dr Wang Shao-wu, State Grid of China)	Thur, 19 July	8:00 to 12:00	CM1
T3	HVDC For Power Transmission (Bo Westman, ABB)	Thur, 19 July	8:00 to 12:00	CM2
T4	Tap Changer Control & Paralleling (Tom Jauch, Beckwith)	Thur, 19 July	13:00 to 17:00	CM5
T5	Application of FACTS in 800 kV Transmission Systems (Per Halvarsson and Dr L Angquist, ABB)	Thur, 19 July	13:00 to 17:00	CM1
T6	800 kV HVDC Technology (Dr Lv Jinzhuang, China Southern Power Grid Co.)	Thur, 19 July	13:00 to 17:00	CM2
T7	Incentive Based Regulation for Power Distribution (Robert Koch, Eskom)	Fri, 20 July	7:30 to 11:00	CM1
T8	Managing the Reliability of Ageing Power	Fri, 20 July	7:30 to 11:00	CM2

	Transformers (Dr Alan Wilson, Doble)			
T9	How to tell a good OHL design (Rob Stephen, Eskom)	Fri, 20 July	11:30 to 15:00	CM1
T10	New Developments in Renewable Energy Generation (Prof. JA Ferreira, Delft University of Technology)	Fri, 20 July	11:30 to 15:00	CM2

Tutorials T2 and T5; T3 and T6; T7 and T9; T4 and T8 are stable partners.

Delegates are encouraged to register for both stable partner tutorials and ensure continuity of subject.

Friday 20, July 2007

15:00 Thank you function: Local Organizing Committee

"The Great South African Braai, Wine and Malt", WITS CLUB

Saturday 21 July 2007

Post Conference Technical Tour for Members and Companions

(see www.ewh.ieee/conf/powerafrica for registration details)

Weekend 21 - 22 July 2005

To visit the under refurbishment Apollo HVDC 533 kV Converter Station outside Johannesburg and the heavy industrial node of Witbank that is residence to several of Eskom's World Class Performance 3600 MW thermal power stations, to Visit the Kendal Power Station with overnight stay on the trout farms of the Lowveld; trout fishing all Sunday.

09:00 Post Conference Tour Departs Sunnyside Park Hotel

Sunday 22 July 2007

16:00 Post Conference Tour Returns to Sunnyside Park Hotel

Weekday Companion Tours

Soweto, Sterktontein Caves, World Class Theme Park at Gold Reef City, War Museum, Johannesburg Zoo, Botanical and Japanese Gardens, Temples, Mosques, Churches, Shopping Malls and Traditional Markets,

And Playhouse Theatres**.**

EXTENDED TOURS

The Great Southern African Experience

Kruger National Park – South Africa

Victoria Falls – Zimbabwe or Zambia

Chobe River – Botswana/Namibia

Islands of Mozambique - Mozambique

Private extended tours to the most beautiful sites can be arranged for individuals or groups. All arrangements can be done for one or many delegates and is prepared by the Travel Desk at the SUNNYSIDE PARK HOTEL.

To make your reservation: Send requirements directly to – Nisha Chuturgoon
Fax: +27 11 642-0019 Tel: + 27 11 640-0400

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