

Technical Sessions

Session RES II: Renewable Energy Sources

Session Chairman: Dr G M Burt, University of Strathclyde, UK

Time and Place: Wednesday 3rd September, 11:30 – 13:30, Lecture Theatre D

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Towards a Community Impact Assessment of Renewable Energy Systems: a case study in the isle of Islay Hain J J, Ault G W, Galloway S J, Gair S, and McDonald J R, University of Strathclyde, UK	589
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Energy Saving Display Using Light Emitting Polymers Hajto J, Firth A, Hindle C, and He Z, Napier University, Scotland UK	597
Novel Railway Signal Display Using Fluorescent Dye Doped Polymers Firth A, Hajto J, He Z, and Gupta N, Napier University, Scotland UK	601
Power Harvesting for Wearable Electronics Carrol D, and Duffy M, National University of Ireland, Ireland	605



38th International Universities Power Engineering Conference UPEC 2003

1 - 3 September 2003, Thessaloniki, Greece

CONFERENCE PROGRAMME

Organised by

High Voltage Laboratory
Faculty of Electrical and Computer Engineering
School of Engineering
Aristotle University of Thessaloniki, Greece

Session PSP II: Power System Protection

Session Chairman: Dr R Turri, University of Padova, Italy

Time and Place: Wednesday 3rd September, 11:30 – 13:30, Lecture Theatre B

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Computing Method of the Equivalent Resistivity of Non-Uniform Soil for the Design of Transmission Substation Grounding Grids Aravanis J, Tzouveleakis E, Chronopoulos C, and Antoniou T, Public Power Corporation SA, Greece	709
Exact and Approximated Methods for Earthing Systems in Multi-Layer Soil (Three Layers) Gouda O E, Cairo University, Egypt Thabet M A, High Institute of Energy, Egypt Amer G M, Benha High Institute of Technology, Egypt	713
Frequency Response of Earthing Systems Griffiths H, Zedan B, and Haddad A, Cardiff University, UK	717
Impulse Response of Transmission Tower Earthing System Harid N, Griffiths H, Haddad A, Cardiff University, UK Walker K, National Grid, UK	721
Switching Overvoltage Reduction by Multiple Resistor and Phase-Controlled Circuit Breakers Ametani A, Inoue N, Mori N, and Nagaoka N, Doshisha University, Japan	725
The Study of High Voltage Shunt Reactor Protection of Series Compensated Line Hu Y F, Yin X G, Chen D S, and Zhang Z, Huazhong University of Science and Technology, China	731



Technical Sessions

Session RES I: Renewable Energy Sources

Session Chairman: Dr T J Hammons, University of Glasgow, UK

Time and Place: Wednesday 3rd September, 09:00 – 11:00, Lecture Theatre D

Standard for the Quantification of CO2 Emission Credits

Hammons T J, University of Glasgow, UK

McConnach J S, Castle Hill Engineering Services, Canada

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Design and Testing of a Pollution Free Hybrid Fuel Cell-Battery Vehicle

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McGrath D J, Aklil-D'Halluin D D, Angelis Y, siGEN Ltd, UK

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Geographical Information System (GIS) Techniques Applied to Network Integration of Marine Energy

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Application of GPS to Current Interrupter Used for Cathodic Protection Survey

Valette S, North East Corrosion Engineers, UK

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Impact of Inverter Size on PV System Energy Production and Cost

Ramachandran J, Pearsall N M, and Putrus G A, Nortumbria University, UK

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Comparison between Batteries and Fuel Cells and Environmental Evaluation of PV-Fuel Cell Hybrid Power Plant

Kalantar M, and Sedighzadeh M, Iran University of Science and Technology, Iran

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38 th	International Universities Power Engineering Conference (UPEC 2003)
	High Voltage Laboratory Faculty of Electrical and Computer Engineering School of Engineering Aristotle University of Thessaloniki, Greece 1 - 3 September 2003, Thessaloniki
Organised by	

Welcome Address

Dear friends and colleagues,

I am very glad and proud to welcome in Thessaloniki, the capital of Macedonia, all the participants and guests of the 38th International Universities Power Engineering Conference. This conference was organised this year by the High Voltage Laboratory of the Department of Electrical Energy of the Faculty of Electrical and Computer Engineering of the School of Engineering of the Aristotle University of Thessaloniki.

The International Universities Power Engineering Conference or UPEC as it is more commonly known, with a history of 38 years, has provided and hopefully still provides engineers and Academia an opportunity to find and explore the newest trends in the development of Power Engineering and the scientific methodology that is connected with it.

After a review carried out by the International Steering Committee and the Local Organising Committee, 185 papers reflecting the effort and knowledge of engineers and allied scientists from 32 countries will be published in the Proceedings. All these papers after being judged for their affinity to the subject of the conference in abstract form were then reviewed in full form by a committee of competent scientists. Further the papers will be presented by their authors and discussed in the oral sessions.

As is the custom of all the UPEC, or at least the ones I have attended, besides being scientific events helping engineers and allied scientists to get acquainted with the state of the art in Power Engineering have also a considerable social dimension not only in allowing personal contact and discussions with colleagues from various countries but also in helping them to know a few things about the country that hosts the conference. For this reason the following social events will take place.

Two receptions will take place and a guided tour of the city of Thessaloniki, a city with a 2300 year long history and a very rich collection of monuments form a very big array of cultures like Late Classical, Hellenistic, Roman, Byzantine, Post-Byzantine, Islamic and Modern. Also for those interested and after the end of the conference, two excursions were organised, the first at the Macedonian Royal tombs at Vergina, where the tomb of King Philip father of Alexander the Great can be visited with all its gold and treasures. That tomb was found intact and was excavated by the late Professor Andronikos of this University. The second will be a one day cruise around the Mt. Athos peninsula, a self governing monastic republic, where the beauty of many medieval monasteries amidst a most beautiful and unspoiled nature can be contemplated.

On behalf of the Local Organising Committee I wish to express our thanks to the members of the International Steering Committee and to the session Chairmen. Also to the Rector and Council of the University, the Dean and Council of the School of Engineering, to the President and General Assembly of the Faculty of Electrical and Computer Engineering, to the Director and General Assembly of the Department of Electrical Energy, to the President and governing committee of the "Technical Chamber of Greece", to the Public Power Corporation S.A., to CRES, the IEEE and the IEE.

I also wish to present my personal thanks to the members of the Local Organizing Committee, to the staff of the "Syntonos" agency and especially to Ass. Professor P. N. Mikropoulos and the Staff of the High Voltage Laboratory without whose selfless dedication this conference would not have been able to take place.

Finally let me conclude by thanking all the participants and wishing them all a very fruitful and pleasant conference and stay in Thessaloniki.

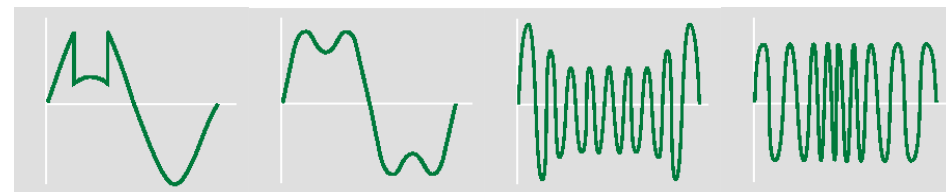
Professor C A Stassinopoulos
Conference Chairman

Session PSH: Power System Harmonics

Session Chairman: Dr H Schau, Ilmenau Technical University, Germany

Time and Place: Wednesday 3rd September, 09:00 – 11:00, Lecture Theatre C

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Jamali S, and Mousavi S A, Iran University of Science and Technology, Iran	
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Harmonics in Spinning Mills: Causes, Effects and Solutions	265
Dimoulias Ch, Aristotle University of Thessaloniki, Greece	
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Azouaou R, Bessai H, Rabahallah S, Leulmi S, and Ghezaili M, University of Tizi-Ouzou, Algeria	
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Session PSP I: Power System Protection

Session Chairman: Prof O E Gouda, Cairo University, Egypt

Time and Place: Wednesday 3rd September, 09:00 – 11:00, Lecture Theatre B

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A New PMUs Based Relay for Series Compensated Transmission Lines 673
Yu C S, National Defense University, Taiwan
Liu C W, Jiang J A, National Taiwan University, Taiwan

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Moravej Z, Moshanir Co., Iran

Fault Location Based on Symmetrical Components 681
Abouelenin F M, Alexandria University, Egypt

Fault Type Classification in Power Distribution Feeders Utilizing Statistical Functions and Neural Networks 685
Abdel-Latif A N, Egyptian Electricity Transmission Company-Canal Zone, Egypt
Abdel-Gawad A F, Ishak A A, Mandour M E, Zagazig University, Egypt

Indices for Relay Protection Quality in Distribution Network 689
Bekut D, Djuric D, and Beric I, University of Novi Sad, Yugoslavia

Optimization Procedure for Time Setting/Coordination of Relays 693
Bekut D, Djuric D, and Beric I, University of Novi Sad, Yugoslavia

Effect of TCPST on Distance Relay Tripping Characteristic 697
Jamali S, and Shateri H, Iran University of Science and Technology, Iran



38th International Universities Power Engineering Conference 1st, 2nd and 3rd September 2003 Aristotle University of Thessaloniki, Greece

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Dr. G A Putrus	University of Northumbria at Newcastle, UK
Dr. H Schau	Technical University of Ilmenau, Germany
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Mr. D Pinches	ALSTOM, Transmission Switchgear, UK

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 Institution of Electrical and Electronic Engineers (IREE)
 Technical Chamber of Greece (TCG)
 Public Power Corporation SA (PPC), Greece
 Centre for Renewable Energy Sources, Greece

UPEC 2003

The 38th International Universities Power Engineering Conference will be held at Aristotle University of Thessaloniki on the 1st, 2nd and 3rd September 2003. The conference will be organised by the High Voltage Laboratory of the Department of Electrical Energy of the Faculty of Electrical and Computer Engineering of the School of Engineering of the Aristotle University of Thessaloniki.

The conference provides engineers and academia with the opportunity to explore recent developments, current practices and future trends in power engineering. Young engineers and research students are especially invited to contribute.

Papers

One hundred and eighty three papers have been included in the conference proceedings. They have been consolidated into one volume. The papers represent contributions from the following 32 countries:

Algeria	Germany	Jordan	Slovakia
Australia	Greece	Kuwait	Taiwan
Belgium	Iceland	Libya	Thailand
Canada	India	Malaysia	The Netherlands
China	Iran	Pakistan	Turkey
Egypt	Ireland	Poland	United Arab Emirates
Finland	Italy	Portugal	United Kingdom
France	Japan	Romania	Yugoslavia

Oral Sessions

All UPEC 2003 papers will be presented orally in sessions of two hours in length. The Chairman of each session will allow 10 minutes per presentation followed by 5 minutes of questions. Please be present in the Lecture Theatre 15 minutes before the session starts in order to meet the Chairman and familiarize yourself with the facilities available for your presentations.

Session HVE II & LP: High Voltage Engineering and Lightning Protection

Session Chairman: Assoc Prof M Danikas, Democritus University of Thrace, Greece

Time and Place: Tuesday 2nd September, 11:30 – 13:30, Lecture Theatre D

Eliminating White Noises from Acoustic Discharge Signals Using Adaptive Filter Techniques Ramli A Q, and Wang Z D, UMIST, UK	89
Effect of Oil Flow on Partial Discharges in Power Transformers Sofian D M, and Wang Z D, UMIST, UK	93
The Effects of Temperature on Partial Discharges in Transformer Insulation Jimoh K A, and Wang Z D, UMIST, UK	97
Selection of the Optimal Insulator Type for a New HV Overhead Transmission Line, Using the Method of the Multicriterial Decision Making Fotis, G P, Kontargyri V T, Gonos I F, and Stathopoulos I A, National Technical University of Athens, Greece	101
Insulation Co-ordination of Compact Substations Ullah N, Haddad A, German D M, Cardiff University, UK Tong YK, Tyco Electronics, UK	105
An Improved Backflashover Model for Estimating the Lightning Performance of Transmission Lines Ekonomou L, Gonos I F, Stathopoulos I A, National Technical University of Athens, Greece	109
Insulation Flashover-Voltage Probability Distribution Influence to the Overhead Line Lightning Performance Estimation Savic M, University of Belgrade, Yugoslavia Skuletic S, Muratovic D, University of Montenegro, Yugoslavia	113
Transient Analysis of a Buried Horizontal Conductor by an FDTD Method Baba Y, Nayel M, Doshisha University, Japan Sekioda S, Kansai Tech Corporation, Japan Nagaoka N, Ametani A, Doshisha University, Japan	117



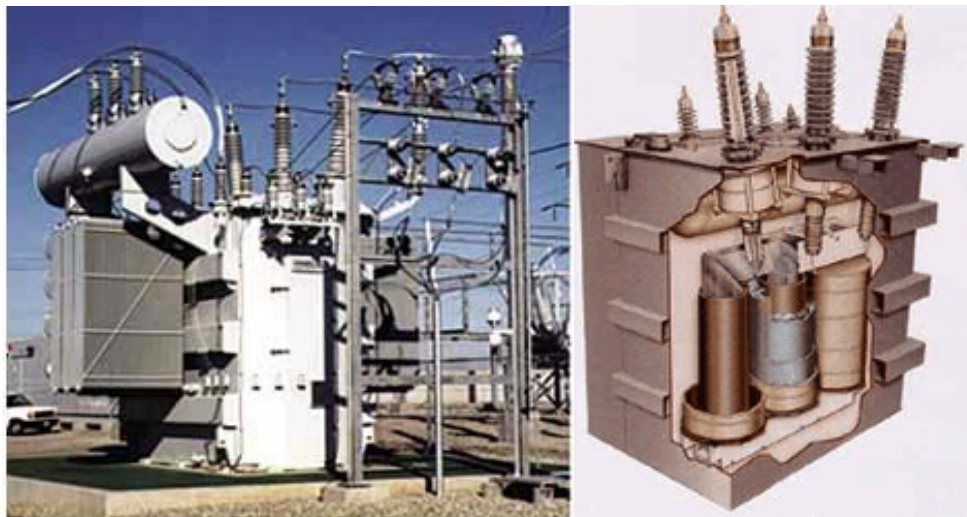
Technical Sessions

Session PT: Power Transformers

Session Chairman: Dr M A Redfern, University of Bath, UK

Time and Place: Tuesday 2nd September, 11:30 – 13:30, Lecture Theatre C

- A Comparison of Methods to Determine the Reactance of a Power Transformer Using Analytical Techniques and Finite Element Analysis** 529
Pinches D S, ALSTOM T&D LTD, UK
Al-Tai M A, Tennakoon S B, Staffordshire University, UK
- A Transformer Protection Using Virtual 3rd Harmonic and Sampled Value Differential Techniques** 533
Yang J C, Yin X G, Chen D S, Zhang Z, and Wang Z H, Huazhong University of Science and Technology, China
- Application of Information Fusion Technology in Power Transformer Monitoring and Fault Diagnose** 537
Wenping H, Xianggen Y, Zhe Z, and Deshu C, Huazhong University of Science and Technology, China
- Improvement in the Performance of Series Connected on Load Tap Changer Transformers Using Local Measurements to Determine Upstream Tap Changer Control Actions** 541
Smith C A, and Redfern M A, University of Bath, UK
- Application of Lagrange Method in Optimal Design of Toroidal Transformers** 545
Jalebi E A, University of Cambridge, UK
Oraee H, Sharif University of Technology, Iran
- Simple Equivalent Circuit of Air-Core Coil for Transient Simulation** 549
Mizuno S, Nagaoka N, Tanigaki K, and Ametani A, Doshisha University, Japan



Prizes

Two prizes will be awarded for the best papers, one for the best oral presentation by a student under the age of 30 and one for the best paper.

Language

The working language will be English. No translation service will be available

Civic Reception

The Conference Reception will be held on the evening of Monday 1st September 2003 at “Villa Bianca” that has been gracefully provided by the Municipality of Thessaloniki. Coaches will depart at 20.30 pm.

Cultural Visit

A guided tour of the city of Thessaloniki will take place, a city with a 2300 year long history and a very rich collection of monuments form a very big array of cultures like Late Classical, Hellenistic, Roman, Byzantine, Post-Byzantine, Islamic and Modern.

Banquet

The Banquet will be held on the evening of Tuesday 2nd September 2003 at the gardens of the Prefecture of Thessaloniki. Coaches will depart at 20.30 pm.

Refreshments and Lunches

Refreshments will be provided and Lunches will be served in the entrance Hall of the Main Building.

Conference Address

High Voltage Laboratory
Department of Electrical Energy
Faculty of Electrical and Computer Engineering
School of Engineering
Aristotle University of Thessaloniki
Thessaloniki GR-54124
Tel./ Fax: +30 2310 996389
e-mail: upec03@eng.auth.gr

Registration

The Conference registration desk will be open at the following times:

Sunday 31 st August	5.30pm – 9.00pm
Monday 1 st September	9.00am – 2.00pm
Tuesday 2 nd September	9.00am – 2.00pm
Wednesday 3 rd September	9.00am – 2.00pm

Program Overview

Time	Sunday 31 August	Monday 1st September	Tuesday 2nd September	Wednesday 3rd September
9.00-10.00		Registration	Sessions 4: 4a. PSOC IV	Sessions 6: 6b. PSP I
10.00-11.00		Opening Ceremony & Keynote Address	4b. TDS I 4c. PEE 4d. HVE I	6c. PSH 6d. RES I
11.00-11.30		Refreshments	Refreshments	Refreshments
11.30-13.30		Sessions 1: 1a. PSOC I 1b. PSSA I 1c. PE I 1d. PG	Sessions 5: 5a. PSOC V 5b. TDS II 5c. PT 5d. HVE II & LP	Sessions 7: 7b. PSP II 7d. RES II
13.30-15.00		Lunch	Lunch	Lunch
15.00-15.30		Sessions 2: 2a. PSOC II 2b. PSSA II	Free Evening City tour	Closing Ceremony & Prizes
15.30-17.00		2c. PE II 2d. EMD I		
17.00-17.30		Refreshments		
17.30-19.30	Registration	Sessions 3: 3a. PSOC III 3b. PSSA III 3d. EMD II		
19.30-21.00		Steering Committee Meeting		
21.00-		Conference Reception	Banquet	

Opening Ceremony & Keynote Address: Lecture Theatre A

Closing Ceremony & Prizes: Lecture Theatre A

Sessions a: Lecture Theatre A

Sessions b: Lecture Theatre B

Sessions c: Lecture Theatre C

Sessions d: Lecture Theatre D

Session TDS II: Transmission and Distribution Systems

Session Chairman: Prof E B Hreinsson, University of Iceland, Iceland

Time and Place: Tuesday 2nd September, 11:30 – 13:30, Lecture Theatre B

Improving Transient Stability of AC system with HVDC Light

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Zhaoqing H, Chengxiong M, Jiming L, Weibo L, and Wang D, Huazhong University of Science and Technology, China

Interaction between 2x25 kV - 50 Hz Traction System and Three-phase Power Supply Network

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Caramia P, Verde P, University of Cassino, Italy
Battistelli L, Carpinelli G, Proto D, University of Napoli "Federico II", Italy

Limitations and Utilisation of a Distribution Network with Dispersed Generators:

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A Practical Case Study

Liu C H, Myrzik J M A, Cobben J F G, and Kling W L, Technical University of Eindhoven, The Netherlands

Pricing for Wheeling Charge Based on Determination of Transmission Path

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Li R, Tokyo Metropolitan University, Japan
Chen L, Osaka Sangyo University, Japan
Magori H, Tokyo Electric Power Services Co. Ltd, Japan
Yokoyama R, Tokyo Metropolitan University, Japan

Stochastic Determination of Power Cables Ratings in Electrical Distribution Generation Systems

657

Hegazy Y G, Chikhani A Y, University of Waterloo, Canada

Voltage Sag Characteristics of Covered Conductor Feeders

661

Heine P, Helsinki University of Technology, Finland
Pitkänen J, Pirelli Cables and Systems Oy, Finland
Lehtonen M, Helsinki University of Technology, Finland

Geographic Information System for the Digitization and Management of Electrical Networks

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Psalidas M S, Agoris D, Pyrgioti E, University of Patras, Greece
Kiliass V, Stratis P, Tigas K, Centre for Renewable Energy Sources, Greece



Technical Sessions

Session PSOC V: Power System Operation and Control

Session Chairman: Dr G A Putrus, Nortumbria University, UK

Time and Place: Tuesday 2nd September, 11:30 – 13:30, Lecture Theatre A

Independent Power Producers Parameters Estimation

Sterpu S, Bésanger Y, and HadjSaid N, Laboratoire d' Electrotechnique de Grenoble, France

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Power Systems State Estimation - An Overview

Brandão R F M, Carvalho J A B, Instituto Superior de Engenharia do Porto, Portugal
Ferreira I M, Faculdade de Engenharia da Universidade do Porto, Portugal

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A PLC Based Energy Consumption Management System: Preliminary Field Tests and Simulation Results

Tsiamitros D, Lettas N, Papagiannis G, and Tampakis D, Aristotle University of Thessaloniki, Greece

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A S.AR.I.MA Short Term Load Forecasting Model for the Autonomous Electric Power System of Crete

Britzolakis G S, and Papazoglou Th, Technological Educational Institute of Crete, Greece

421

Power Distribution Load Forecasting Using Artificial Neural Networks

Eminoglu U, Yalcinoz T, and Herdem S, Nigde University, Turkey

425

The Approximation and Re-sampling of Current and Voltage's Sampling Data in Power Systems

Xu H, Nanjing Institute of Industry Technology, China
Wang H F, University of Bath, UK

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Distribution Automation by IED-s

Watson I, Willis N, and Al-Tai M A, Staffordshire University, UK



Technical Sessions

Session PSOC I: Power System Operation and Control

Session Chairman: Prof C Y Cao, Zhejiang University, China

Time and Place: Monday 1st September, 11:30 – 13:30, Lecture Theatre A

A Multi Agent System for Power System Supervisory Control

Isnadar S and Ozveren C S, University of Abertay Dundee, Scotland UK

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A New Algorithm for Monitoring Low Frequency Oscillation in Real Time

Yang J Z, Liu C W, National Taiwan University, Taiwan
Wu W G, ADX Scientific Co Ltd, Taiwan

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An Adaptive Control Strategy for Parallel and Isolated Operation of Dispersed Generators

Sishuba S and Redfern M A, University of Bath, UK

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Automatic Control Method Considering Decreasing Output of LFC and Time Difference Compensation

Kondou Y, Mizutani Y, Aoki H, Tokai University, Japan
Goto Y, Yukita K, Aichi Institute of Technology, Japan

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Design of Integrated Database for Distribution Management System

Popović D S, University of Novi Sad, Yugoslavia
Memarovic R, Power Industry of Serbia, Yugoslavia

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Development of Computer-Based Cost Effective Monitoring for Substations

Yu F, and Gupta N K, Napier University, Scotland UK

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Power System Control Applications Based on Artificial Immune Systems

Ali G, Wang H F, and Aggarwal R, University of Bath, UK

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The Design of a Support System for the Management of Flexible Power Distribution Networks

Korbik A, Burt G M, McArthur S D J, and McDonald J R, University of Strathclyde, UK

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Technical Sessions

Session PSSA I: Power System Simulation and Analysis

Session Chairman: Dr G Papagiannis, Aristotle University of Thessaloniki, Greece

Time and Place: Monday 1st September, 11:30 – 13:30, Lecture Theatre B

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Development of High Speed Genetic Algorithm Based on Search-less Space Elite Optimization Type 437

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Fuel Cost Characteristics of CCP and Simple Cycle Multiple Fuel Units 449

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Bhandari N M, Galloway S J, Burt G M, and McDonald J R, University of Strathclyde, UK

Voltage and Reactive Power Control by GA Considering System Decomposition 457

Aoki H, and Mizutani Y, Tokai University, Japan

Voltage and Reactive Power Control by Integrating Genetic Algorithm and Tabu Search 461

Aoki H, Yamamoto K, and Mizutani Y, Tokai University, Japan

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Wang Z H, Yin X G, Zhang Z, and Yang J C, Huazhong University of Science and Technology, China



Session HVE I: High Voltage Engineering

Session Chairman: Prof I A Stathopoulos, National Technical University of Athens, Greece

Time and Place: Tuesday 2nd September, 09:00 – 11:00, Lecture Theatre D

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Simulation of streamer propagation under DC voltage of positive polarity 73

Charalambakos V P, Agoris D P, and Pyrgioti E C, University of Patras, Greece

Simulation of Tree Propagation in Polyethylene in Plane-Plane Electrode Arrangement Using Cellular Automata: The Effect of Homocharges and Heterocharges 77

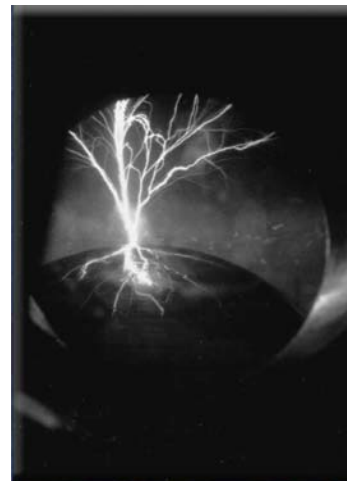
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The Effect of Corona Electrode Configurations on Charge Injection in a Pulsed ESP 81

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Session Chairman: Dr T Yalcinoz, Nigde University, Turkey

Time and Place: Tuesday 2nd September, 09:00 – 11:00, Lecture Theatre A

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Decentralized Congestion Management of Interconnected Power Systems

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Instituto Superior de Engenharia de Coimbra, Portugal
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Web Services Platform for Power System Development Planning

McMorran A W, Ault G W, Foote C E T, Burt G M, and McDonald J R, University of Strathclyde, UK



Session PSOC II: Power System Operation and Control

Session Chairman: Prof Q H Wu, The University of Liverpool, UK

Time and Place: Monday 1st September, 15:00 – 17:00, Lecture Theatre A

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Multimachine Power System Stability Improvement for Coordinated Multiple Pole Shifting Technique

Shabib G, Aswan High Institute of Energy, Egypt

Optimal Coordinated Generator Excitation and SMEs Control for Transient Stability Improvement of Power System

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Okabe T, Electric Power Development Co. Ltd, Japan
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An extended Method to Compute the Unstable Equilibrium Points in Power Systems

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Zhang H X, Huazhong University of Science and Technology, China

Analysis of the Generators Tripping in the Transient Stability of an Electrical Power Network Using a Hybrid Method

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Technical Sessions

Session PSSA II: Power System Simulation and Analysis

Session Chairman: Prof J A Dias Pinto, Instituto Superior de Engenharia de Coimbra, Portugal

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Session Chairman: Prof H Oraee, Sharif University of Technology, Iran

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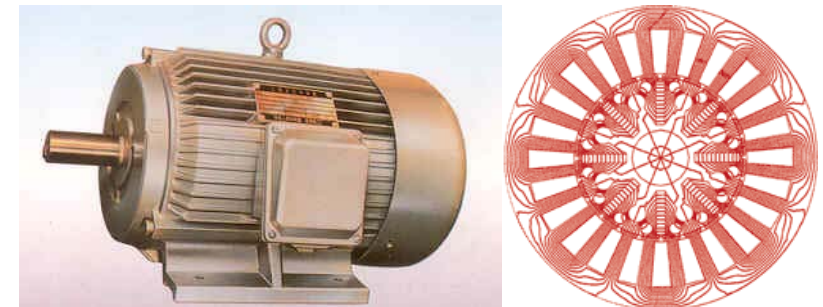
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Session PSSA III: Power System Simulation and Analysis

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Session Chairman: Dr N K Gupta, Napier University, UK

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Technical Sessions

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Session Chairman: Dr M S Khanniche, University of Wales, Swansea, UK

Time and Place: Monday 1st September, 15:00 – 17:00, Lecture Theatre D

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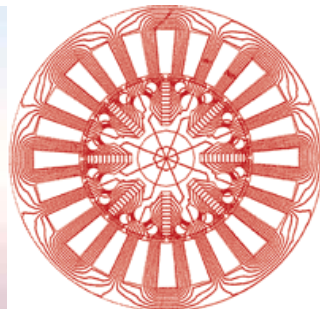
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Session Chairman:

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