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## Welcome from Conference Chair

On behalf of the Organising Committee of the 14<sup>th</sup> International Conference on Harmonics and Quality of Power (ICHQP2010), we welcome all delegates and visitors to Bergamo.

We sincerely thank the Steering Committee of the ICHQP for the encouragement and support provided over the last few years to hold this conference in Italy and feel very honoured by the recognition they have demonstrated towards our activities.

Our sincere gratitude is offered to the members of the Technical Review Committee who have worked tirelessly to review the papers.

The sponsorships provided by a2a, ABB, BM, Enel Distribuzione, Energifera, Fondazione MIA, RSE, Santerno, Schneider Electric, Siemens are greatly appreciated.

We sincerely wish to acknowledge the contributions made by our Colleagues and the Organising Committee towards making this conference a success.

On behalf of the Organising Committee, we also wish to thank the Department of Electrical Engineering and the Department of Energy of Politecnico di Milano for the support provided.

Sincere thanks to all Authors that made this conference possible through their interesting papers.

We hope you will find the conference stimulating and enjoyable, have a memorable time in Italy and have an opportunity to renew old friendships and make new ones.

Enrico Tironi

Dario Zaninelli

## **ICHQP Steering Committee**

Yahia Baghzouz (USA) – Co–Chair  
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Thomas Ortmeyer (USA)  
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Alfredo Testa (Italy)  
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# ICHQP2010 Organising Committee

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Dario Zaninelli (Politecnico di Milano) – Co–Chair

## Committee Members

Alberto Berizzi (Politecnico di Milano)

Roberto Caldon (Università di Padova)

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Guido Carpinelli (Università di Napoli)

Mircea Eremia (Polytechnic University of Bucharest)

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## ICHQP Scientific Secretariat

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Federica Foadelli (Politecnico di Milano)

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Dario Zaninelli (Italy) – Chair  
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Alfredo Testa (Italy)  
Enrico Tironi (Italy)  
Paola Verde (Italy)  
Irena Wasiak (Poland)  
Kazimierz Wilkosz (Poland)

## **General Information**

### **Conference Venue**

Conference Center "Centro Congressi Giovanni XXIII"  
Viale Papa Giovanni XXIII, 106  
24121 Bergamo  
Italy

Sala Oggioni – ground level  
Sala Stucchi – first floor  
Sala Alabastro – A – second floor  
Sala Alabastro – B – second floor  
Sala Novelli – second floor

### **Registration and Information Desks**

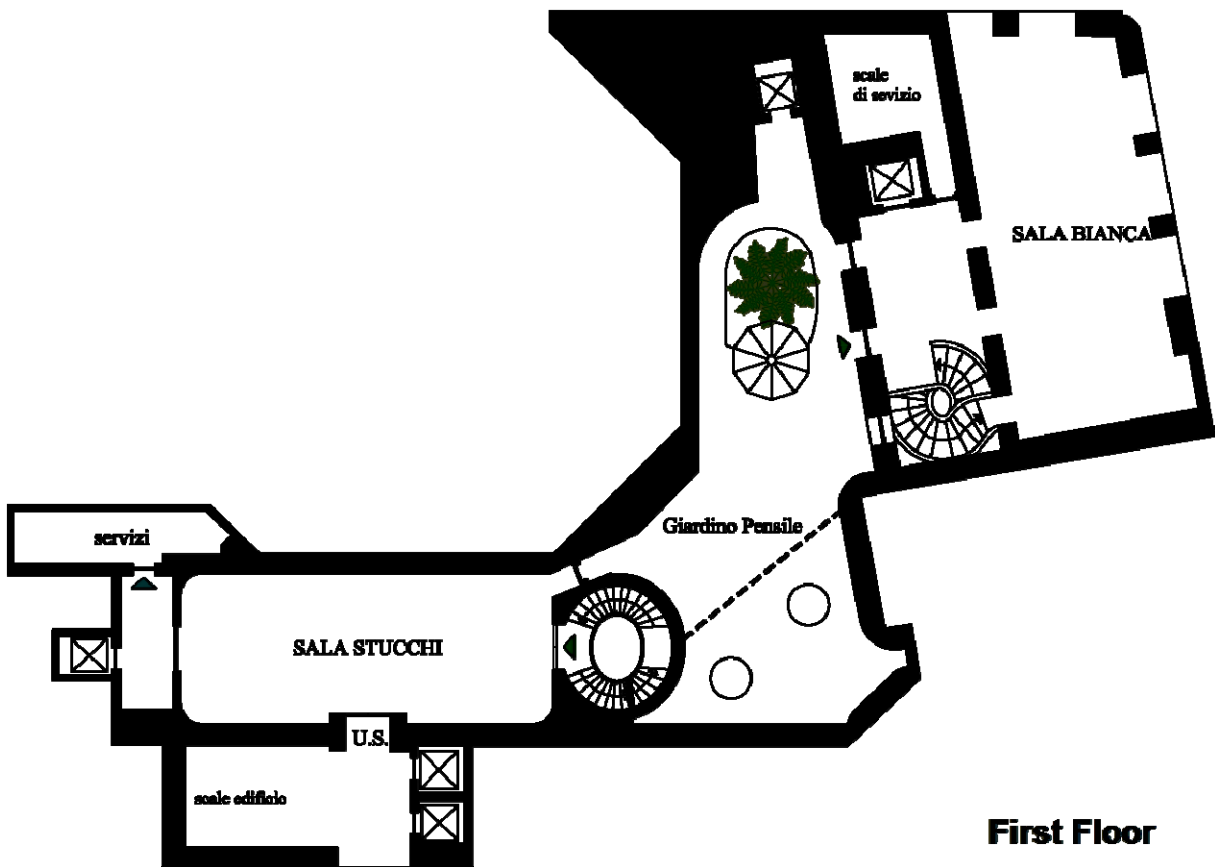
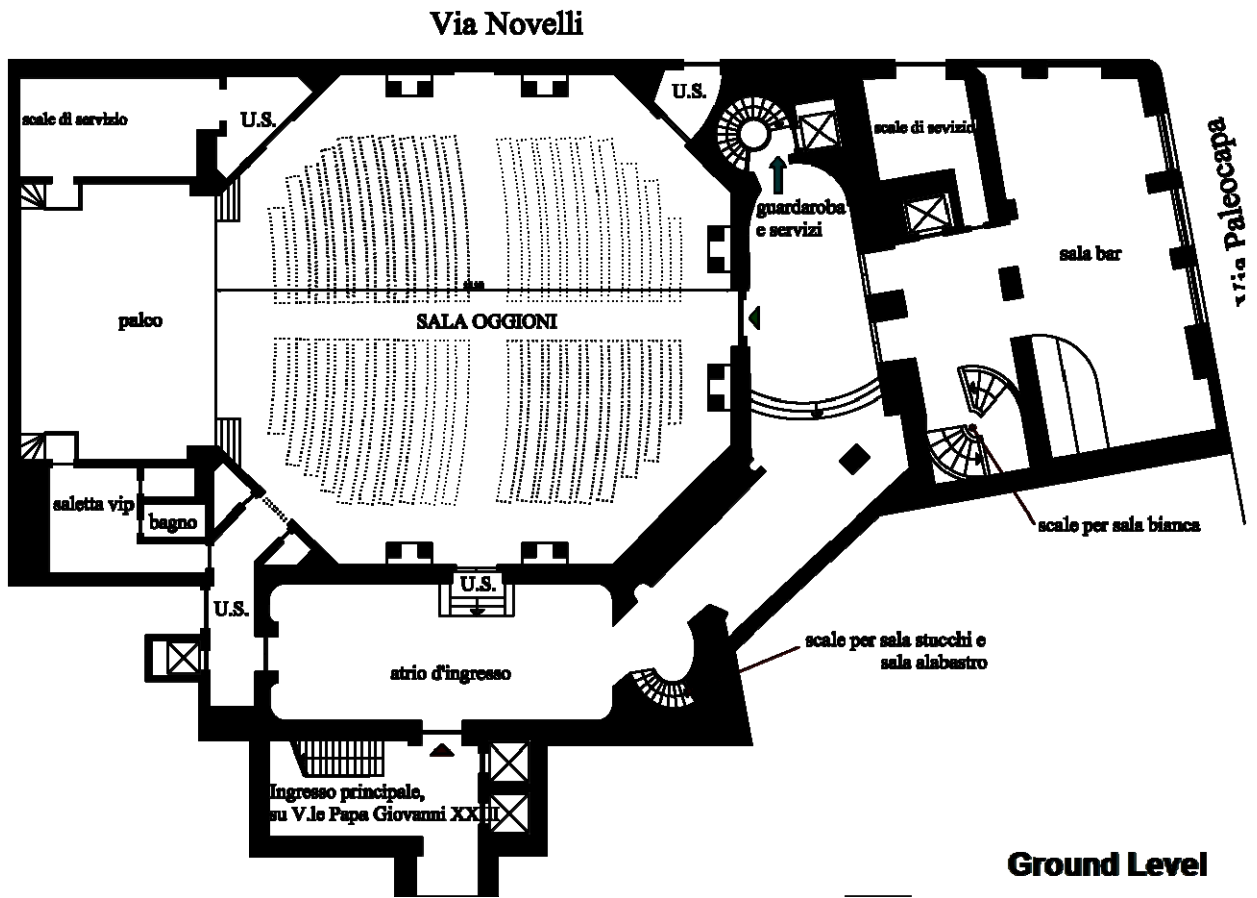
Sunday 26<sup>th</sup> September – Centro Congressi Giovanni XXIII, 9:00 – 20:00  
Monday 27<sup>th</sup> September – Centro Congressi Giovanni XXIII, 8:00 – 18:00  
Tuesday 28<sup>th</sup> September – Centro Congressi Giovanni XXIII, 8:00 – 14:00  
Wednesday 29<sup>th</sup> September – Centro Congressi Giovanni XXIII, 8:00 – 13:00

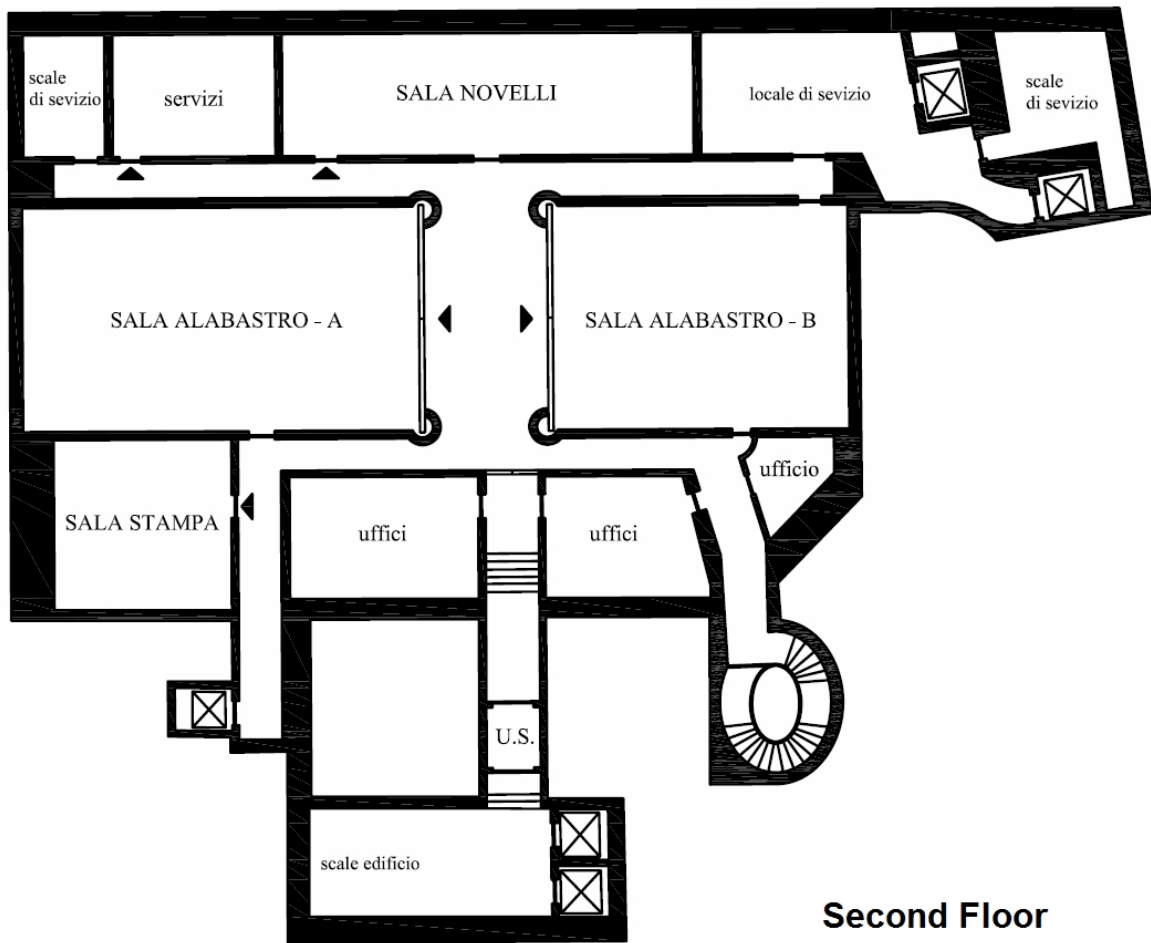
Delegates and accompanying persons will be issued with name badges which must be worn during the conference and social events. Entrance to various conference sessions and activities will be strictly through registration only.

### **Smoking Policy**

According to the Italian law it is not allowed any smoking inside the buildings.

# Congress Center Centro Congressi Giovanni XXIII Map





### Getting to the Congress Center Centro Congressi Giovanni XXIII

The map displays the location of the **CONGRESS CENTER** in Bergamo, Italy, marked with a green arrow. The center is situated near the **RAILWAY STATION** and **BUS STATION**. Several hotels are marked with red pins and labeled with letters A through E:

- A** – Hotel Mercure Palazzo Dolci
- B** – Hotel Piemontese
- D** – Hotel NH Bergamo
- E** – Hotel Arli

Other nearby locations include Hotel Cappello d'Oro, ARLI HOTEL Business & Wellness, and Central Hostel BG. Major roads like Via Angelo Mai and Via Bartolomeo Bono are also shown.

## **Morning & Afternoon Coffee/Tea Break**

Morning and afternoon coffee/tea break will be provided in the Congress Center Centro Congressi Giovanni XXIII.

## **Lunch**

Italian buffet lunch will be provided in the Congress Center Centro Congressi Giovanni XXIII.

## **Social Events**

**Welcome Reception** – will be held at the Congress Center Centro Congressi Giovanni XXIII on Sunday 26<sup>th</sup> September 2010 starting from 18:30.

**Conference tour** – the conference tour is scheduled for the afternoon of Tuesday 28<sup>th</sup> September. The conference tour consists in a guided visit to the historical part of the wonderful city of Bergamo.

Buses will depart from the Conference Center Centro Congressi Giovanni XXIII at 14:30pm.

**Opera Concert** – will be held in the prestigious Sala Piatti at 19:00 of Tuesday 28<sup>th</sup>

**Conference dinner** –will be held on Tuesday 28<sup>th</sup> September at "Il Pianone" Restaurant, inside a park with a beautiful view, starting from 20:15.

The dinner will present typical local Italian dishes and will end with a visit to the cantinas including a grappa liquor degustation.

Buses will return delegates to their hotels at the conclusion of the dinner.

**Accompanying Persons Tour** – different tours can be organized on demand at the Secretariat desk.

## **Guidelines for Authors and Presenters**

The oral presentations at ICHQP2010 has to be prepared and delivered in English. Presentations should be of 'PowerPoint' style for delivery via data projector. Computer and projection facilities will be available at the conference venue.

Presenters will be required to provide their presentations (CD or USB drive format) to the conference support staff located into the conference rooms 15 minutes before the session starting.

Each paper presentation will be 20 minutes in duration consisting of 15 minutes speaking time followed by 5 minutes of question time. Session Chairs will strictly enforce presentation durations.

The poster should be in maximum A0 (84 cm x 120 cm) format and only vertically oriented. No specific guidelines are provided for preparation of the poster. At least one author per paper must be present during the poster session. Posters have to be placed in the reserved space before the session starting and removed after the session. Otherwise posters will be destroyed by organizers. In the Poster Area authors will find everything they need to fix poster on their locations.

## Tutorial Details

One tutorial will be held at the Conference Center Giovanni XXIII on Sunday 26th September 2010 from 10:00 to 17:00.

The theme of the tutorial is Harmonics in the Changing Power System. The various changes in the power system, at generation as well as at consumption side, also have their impact on the harmonic distortion of the voltages and current in the power system. Understanding harmonics is an important part in the new developments in power systems: like renewable sources of energy, energy-saving lamps and smart grids. For example, new resonances are introduced by the use of long cables at transmission levels; end-user equipment shows less distortion at the lower harmonic frequencies but more at higher frequencies; windturbines produce a spectrum that has moderate distortion at integer harmonic frequencies, but higher than normal levels at interharmonic frequencies.

This tutorial will be lead by world renowned experts Professor Math Bollen (Sweden), Professor Guido Carpinelli (Italy), Anders Larsson (Sweden), Sarah Rönnberg (Sweden), Alfredo Testa (Italy) and Paola Verde (Italy). In particular:

1. Introduction to harmonic distortion (Professor Math Bollen)
2. Emission by modern energy-efficient equipment and possible impact on communication (Professor Sarah Rönnberg, Professor Anders Larsson)
3. Harmonics and windpower: emission and resonances (Professor Math Bollen)
4. Interharmonics due to modern switching techniques (Professor Alfredo Testa)
5. Advanced signal processing techniques for monitoring waveform distortion (Professor Guido Carpinelli)
6. Economics of waveform distortion (Professor Paola Verde)
7. Summary and conclusions (Professor Math Bollen)

## Keynote Address Details

One keynote address is scheduled for delivery at ICHQP 2010.

The keynote address, scheduled for delivery at 17:50 on Sunday 26<sup>th</sup> September will be held by Professor Alexander E. Emanuel and is titled "An Introduction to the Concept of Randomness Power".

**Professor Alexander E. Emanuel** was born in Bucharest, Romania in 1937. He completed his engineering education at the Technion, Israel Institute of Technology, where he earned B.Sc., M.Sc. and D.Sc. in 1963, 1965 and 1969, respectively.

In 1969 he started working for High Voltage Engineering, Westborough, MA, as senior R&D Engineer, designing and testing high voltage equipment. He participated in the design of 765 kV, 100 Mvar shunt reactances and SF6 equipment. In 1974 he joined Worcester Polytechnic Institute faculty, teaching graduate and undergraduate classes on Power Electronics, Energy Conversion, Power Systems and Power Quality. He received the Board of Trustees Award for Outstanding Teacher in 1982, for Outstanding Researcher in 1986 and for Outstanding Advising in 2001. He held the George Ira Alden Professorship from 1988 till 1991 and the Weston Hadden Professorship of Electrical and Computer Engineering from 1996 till 1999.

Professor Emanuel is the author and co-author of more than 200 publications. He has been the recipient of eight IEEE prize paper awards. His field of interest is Electric Power Quality, mainly studies of voltage and current waveform distortion effects on electrical equipment as well as apparent power resolution in systems with nonlinear or unbalanced loads. He chairs a few IEEE working groups dealing with standards and power quality guidelines. He is the founder of the International Conference on Harmonics and Quality of Power. He is a registered professional engineer in the state of Massachusetts and a Life Fellow of the IEEE. In the recent years Dr. Emanuel devoted time exposing false energy saving devices. For this activity he was the 1998 recipient of the R.H. Lee Award given by the IEEE Industry Application Society, Industrial and Commercial Power Systems Department. The Power Quality Assurance Journal bestowed on him the 1999 John Mungenast International Power Quality Award.

He just published a book titled "Power Definitions and the Physical Mechanism of Power Flow," Wiley/IEEE.

In 1984 he started the first International Conference on Harmonics in Power Systems.

## **Exhibition Area**

A number of organisations are exhibiting power quality related technologies at ICHQP 2010. The exhibition area is located in the foyer of the Conference Center "Centro Congressi Giovanni XXIII" and will operate throughout the conference.

## **Internet Point**

Internet point will be available near the conference registration and information desk.

## **Contact number in case of difficulties**

In case of difficulties, delegates may call 035236435 for assistance.

# Sessions at a glance

Sunday 26<sup>th</sup> September 2010

10:00 – 17:00	Tutorial "Harmonics in the Changing Power System" (restricted entrance through registration)	
	10:00 – 13:00	<ul style="list-style-type: none"> <li>• Professor Math Bollen – Introduction to harmonic distortion</li> <li>• Professor Sarah Rönnberg and Professor Anders Larsson – Emission by modern energy-efficient equipment and possible impact on communication</li> <li>• Professor Math Bollen – Harmonics and windpower: emission and resonances</li> <li>• Professor Alfredo Testa – Interharmonics due to modern switching techniques</li> </ul>
13:00 – 14:00	Lunch	
	14:00 – 17:00	<ul style="list-style-type: none"> <li>• Professor Guido Carpinelli – Advanced signal processing techniques for monitoring waveform distortion</li> <li>• Professor Paola Verde – Economics of waveform distortion</li> <li>• Professor Math Bollen – Summary and conclusions</li> </ul>
17:30 – 17:50	Conference Opening <i>Sala Oggioni</i>	
17:50 – 18:20	Keynote Address "An Introduction to the Concept of Randomness Power" Alexander Eigeles Emanuel, Worcester Polytechnic Institute <i>Sala Oggioni</i>	
starting from 18:30	Welcome Cocktail Reception – Congress Center "Centro Congressi Giovanni XXIII"	

# Monday 27<sup>th</sup> September 2010

8:00	Registration			
8:30 – 10:30	Parallel Paper Presentation Session 1			
	<b>Session 1A</b> <i>Sala Alabastro A</i> PQ Monitoring/ Reporting Methodologies & Indices  901 902 903 904 905 907	<b>Session 1B</b> <i>Sala Oggioni</i> PQ Mitigation Technologies  801 802 804 808 809 819	<b>Session 1C</b> <i>Sala Alabastro B</i> Renewable Generation/Distributed Generation and PQ  1301 1310 1311 1313 1318 1319	<b>Session 1D</b> <i>Sala Novelli</i> PQ Analysis  601 602 603 604 605 607
10:30 – 11:00	Coffee/Tea Break			
11:00 – 13:00	Parallel Paper Presentation Session 2			
	<b>Session 2A</b> <i>Sala Alabastro A</i> PQ Monitoring/ Reporting Methodologies & Indices  906 909 910 911 912 936	<b>Session 2B</b> <i>Sala Oggioni</i> PQ Mitigation Technologies  810 811 812 814 815	<b>Session 2C</b> <i>Sala Alabastro B</i> Renewable Generation/Distributed Generation and PQ  1303 1306 1316 1317 1308 1309	<b>Session 2D</b> <i>Sala Novelli</i> PQ Analysis  608 609 612 614 615
13:00 – 14:00	Lunch			
14:00 – 16:00	Parallel Paper Presentation Session 3			
	<b>Session 3A</b> <i>Sala Alabastro A</i> PQ Monitoring/ Reporting Methodologies & Indices  914 915 916 917 918 928	<b>Session 3B</b> <i>Sala Oggioni</i> PQ Mitigation Technologies  1102 1103 816 820 1505	<b>Session 3C</b> <i>Sala Alabastro B</i> Renewable Generation/Distributed Generation and PQ  1304 1305 1314 1315 1320 1322	<b>Session 3D</b> <i>Sala Novelli</i> PQ Analysis  613 616 617 620 625
16:00 – 16:30	Coffee/Tea Break			
16:30 – 18:30	Parallel Paper Presentation Session 4			
	<b>Session 4A</b> <i>Sala Alabastro A</i> PQ Monitoring/ Reporting Methodologies & Indices  920 921 924 926 927 929	<b>Session 4B</b> <i>Sala Oggioni</i> Transients – Propagation, Measurement & Modeling  1501 1502 1503 1504 1506 1507	<b>Session 4C</b> <i>Sala Alabastro B</i> PQ Case Studies  708 709 710 711 631	<b>Session 4D</b> <i>Sala Novelli</i> PQ Analysis  624 626 628 629 403

## Tuesday 28<sup>th</sup> September 2010

8:00	Registration			
8:30 – 10:00	Parallel Paper Presentation Session 5			
	<b>Session 5A</b> <i>Sala Alabastro A</i> Economic Impacts of PQ  103 104 105 106 107	<b>Session 5B</b> <i>Sala Oggioni</i> Smart Grids for PQ  1401 1402 1403 1404 1405	<b>Session 5C</b> <i>Sala Alabastro B</i> PQ Case Studies  701 703 705 712	<b>Session 5D</b> <i>Sala Novelli</i> PQ Analysis, Interference and Immunity  202 301 302 622
10:00 – 10:30	Coffee/Tea Break			
10:30 – 12:00	Parallel Paper Presentation Session 6			
	<b>Session 6A</b> <i>Sala Alabastro A</i> PQ Standards + PQ State Estimation  1104 1201 627 101	<b>Session 6B</b> <i>Sala Oggioni</i> Interharmonics & Other Non-Harmonic Distortion  501 502 503 505	<b>Session 6C</b> <i>Sala Alabastro B</i> Renewable Generation/Distributed Generation and PQ  1302 1321 1323 1324	<b>Session 6D</b> <i>Sala Novelli</i> Impact of PQ on Systems and Equipment  401 404 406 821
12:00 – 13:15	<b>POSTER SESSION</b> <i>Sala Stucchi</i>			
13:15 – 14:15	Lunch			
14:30	Conference Social Tour Opera Concert Gala Dinner			

## Wednesday 29<sup>th</sup> September 2010

8:00	Registration			
8:30 – 10:30	Parallel Paper Presentation Session 7			
	<b>Session 7A</b> <i>Sala Alabastro A</i> PQ Monitoring/ Reporting Methodologies & Indices	<b>Session 7B</b> <i>Sala Oggioni</i> Harmonics Generation & Propagation	<b>Session 7C</b> <i>Sala Alabastro B</i> PQ Propagation, Measurements & Modeling	<b>Session 7D</b> <i>Sala Novelli</i> Impact of PQ on Systems and Equipment
	930	307	1001	407
	931	303	1002	408
	932	304	1003	409
	933	305	1004	410
934	306	1005	411	
913	314	1006	412	
10:30 – 11:00	Coffee/Tea Break			
11:00 – 13:00	Parallel Paper Presentation Session 2			
	<b>Session 8A</b> <i>Sala Alabastro A</i> PQ Monitoring/ Reporting Methodologies & Indices	<b>Session 8B</b> <i>Sala Oggioni</i> Harmonics Generation & Propagation	<b>Session 8C</b> <i>Sala Alabastro B</i> PQ Propagation, Measurements & Modeling	<b>Session 8D</b> <i>Sala Novelli</i> Transmission and distribution System Planning
	937	308	1007	1607
	938	309	1009	817
	939	311	1010	1602
	940	313	1011	1608
942	315	1012	1606	
201	316	1013		
13:00 – 13:15	Closing Session and announcement of 15 <sup>th</sup> ICHQP 2012 <i>Sala Oggioni</i>			
13:30	Farewell buffet			

# Detailed Program

## SESSION 1 – Monday 8:30–10:30

### SESSION 1A – PQ Monitoring/ Reporting Methodologies & Indices

Monday 8:30–10:30

Room: Sala Alabastro A

Chairman – W. Howe, EPRI, USA

901 – "The Validation of single point measurements for the localization of multiple harmonic sources"

A.P.J Rens, D. Serfontein, *North West University, South Africa*

902 – "Ancillary Services :definitions, markets and practices in the world"

A.M. Pirbazari, *Chalmers University of Technology, Sweden*

903 – "Instantaneous Power Tensor Theory: Improvement and Assessment of the Electric Power Quality"

A.J. Ustariz Farfan, E.A. Cano Plata, H.E. Tacca, *Universidad Nacional de Colombia, Colombia*

904 – "Power Quality Disturbances Classification Using Specialized Neural Networks"

A.S. Cerqueira, M.B.S. Pinto, M.L.G. Salmento, *Federal University of Juiz de Fora, Brazil;*

D.D. Ferreira, *Federal University of Lavras, Brazil;*

J.M. de Seixas, *Federal University of Rio de Janeiro, Brazil*

905 – "PQ Benchmarking in the Age of the Smart Grid"

W. Howe, *EPRI, USA*

907 – "The new Enel Distribuzione power quality data warehouse and its applications for smart grids"

C. Noce, S. Sartore, *Enel Distribuzione, Italy*

## **SESSION 1B – PQ Mitigation Technologies**

**Monday 8:30–10:30**

**Room:** Sala Oggioni

**Chairman** – A.M. Dán, *Budapest University of Technology and Economics, Hungary*

801 – "Sizing of Passive Filters in Time-Varying Nonsinusoidal Environments"

A. F. Zobaa, *Brunel University, UK;*

A. Vaccaro, *Università degli Studi del Sannio, Italy;*

H. H. Zeineldin, *Masdar Institute of Science & Technology, UAE;*

A. Lecci, *Politecnico di Bari, Italy;*

A. M. Abdel Monem, *ECG, Egypt*

802 – "Modeling and Analysis of Dynamic Voltage Restorer based on SVPWM using PSCAD/EMTDC"

A. Helal, A. Lotfy, *Arab Academy for Science and Technology, Egypt;*

S.Z. Elabideen, *Pharos University, Egypt*

804 – "Towards a more reliable operation of compensated networks in case of single phase to ground faults"

A.M. Dán, D. Raisz, *Budapest University of Technology and Economics, Hungary*

808 – "Tuning Harmonic Absorption of Voltage Source Converters"

G. Ledwich, A. Ghosh, F. Zare, *Queensland University of Technology, Australia*

809 – "Application of a Variable Inductor in Single-Phase Hybrid Harmonic Filters"

H. Dalvand, V.G. Agelidis, *University of New South Wales, Australia*

819 – "Simulations and field test results for potential applications of LV DC distribution network to reduce flicker effect"

L. Martini, A. Brambilla, C. Tornelli, *ERSE, Italy;*

V. Musolino, L. Piegari, E. Tironi, *Politecnico di Milano, Italy*

## **SESSION 1C – Renewable Generation/Distributed Generation and PQ**

**Monday 8:30–10:30**

**Room:** Sala Alabastro B

**Chairman** – Y.Baghzouz, *University of Nevada at Las Vegas, USA*

1301 – "The Impact of Harmonics Calculation Methods on Power Quality Assessment in Wind Farms"

Ł.H. Kocewiak, J. Hjerrild, *DONG Energy Power A/S, Denmark*;

C.L. Bak, *Institute of Energy Technology, Denmark*

1310 – "Wind Power Generation Impact on the frequency regulation: Study on a National Scale Power System"

G. Callegari, F. Lanzi, *CESI SpA, Italy*;

P. Capurso, R. Zaottini, *Terna SpA, Italy*

M. Merlo, *Politecnico di Milano, Italy*

1311 – "Wind Energy Conversion Systems as Active Filters under Unbalanced Load Conditions"

G. Todeschini, *Worcester Polytechnic Institute, USA*

1313 – "Fault Ride-Through of Fully Enclosed Squirrel-Cage Induction Generators for Wind Farms in Thailand"

K. Daunghom, *Provincial Electricity Authority, Thailand*;

S. Premrudeepreechacharn, *Chiang Mai University, Thailand*;

Y.Baghzouz, *University of Nevada at Las Vegas, USA*;

K. Higuchi, *University of Electro-Communications, Japan*

1318 – "Harmonic Resonances due to a Grid-connected Wind Farm"

R. Zheng, *University of Hong Kong, China*;

M.H.J. Bollen, *Luleå University of Technology, Sweden*;

J. Zhong, *University of Hong Kong, China*

1319 – "System monitoring of energy quality for wind power generators"

S.D. Grigorescu, M. Popescu, O. Ghita, G.C. Lazaroiu, *University POLITEHNICA of Bucharest, Romania*

## SESSION 1D – PQ Analysis

**Monday 8:30–10:30**

**Room:** Sala Novelli

**Chairman** – Z. Hanzelka, *AGH University of Science and Technology, Poland*

601 – "Spectral Analysis Techniques for Estimating Power Quality Indices"

R. Zolfaghari, Y. Shrivastava, *University of Sydney, Australia;*

V.G. Agelidis, *University of New South Wales, Australia*

602 – "Classification of Voltage Sag, Swell and Harmonics using S–transform Based Modular Neural Network"

C. Venkatesh, D.V.S.S. Siva Sarma, M. Sydulu, *National Institute of Technology (NIT), India*

603 – "Optimal Choosing and Placing of Reactive Power Sources in an Electrical Distribution Network Harmonically Polluted"

A. Băloi, A. Pană, *"Politehnica" University of Timișoara, Romania;*

N. Chiosa, *Romanian Power Grid Company "Transelectrica", Romania*

604 – "Direct Power Control of Reduced Switch Active Filters"

A. Baktash, A. Jalilian, A. Vahedi, *Iran University of Science and Technology, Iran*

605 – "Load Balancing by Unbalanced Capacitive Shunt Compensation – A Numerical Approach"

A. Pană, A. Băloi, F. Molnar–Matei, *"Politehnica" University of Timișoara, Romania*

607 – "Efficiency and Power Quality in a Drive System Driving Machine"

A.B. de Vasconcellos, R. Apolônio, L. de Annuniação, T.V. da Silva, *Federal University of Mato Grosso, Brazil*

T.I. de Carvalho Malheiro, *Federal Institute of Education, Science and Tecnology of Mato Grosso, Brazil*

R.S. Barros, *State University of Campinas, Brazil*

## SESSION 2 – Monday 11:00–13:00

### SESSION 2A – PQ Monitoring/ Reporting Methodologies & Indices

Monday 11:00–13:00

Room: Sala Alabastro A

Chairman – V. Gosbell, *University of Wollongong, Australia*

906 – "Classification of Power Quality Disturbances using the Hilbert Huang Transform"

C.F. Drummond, D. Sutanto, *University of Wollongong, Australia*

909 – "Clustering of Harmonic Monitoring Data using Data Mining"

D. Sutanto, A. Asheibi, D. Stirling, *University of Wollongong, Australia*

910 – "Power Quality Enhancements for IEC 61850"

D.A. Cumming, *Schneider Electric, Canada*

911 – "Time-Varying Harmonic Analyzer Prototype"

D.F. Fabri, C.H.N. Martins, L.R.M. Silva, C.A. Duque, A.S. Cerqueira, *Federal University of Juiz de Fora, Brazil;*

P.F. Ribeiro, *Calvin College, USA*

912 – "Evaluation of Assessment Methods used to Analyse Measured Power Quality Performance within the South African Context"

E. Venter, R.G. Koch, *Eskom Holdings Limited, South Africa;*

J.H. Pretorius, *University of Johannesburg, South Africa*

936 – "The Australian Long Term Power Quality Survey Project Update"

S. Elphick, V. Smith, V. Gosbell, *University of Wollongong, Australia;*

R. Barr, *Electric Power Consulting, Australia*

## **SESSION 2B – PQ Mitigation Technologies**

**Monday 11:00–13:00**

**Room:** Sala Oggioni

**Chairman** – R.E. Collins, *Clemson University, USA*

810 – "A Voltage Flicker Suppression Device for Residential Air Conditioners and Heat Pumps"

J.C. Fox, R.E. Collins, *Clemson University, USA*

811 – "Modeling for Performance Analysis of Electromagnetic Zero-Sequence Suppressor"

L. C. O. de Oliveira, S. C. L. de Freitas, J. B. de Souza, *University of São Paulo State, Brazil,*

J. C. Oliveira, *Federal University of Uberlandia, Brazil*

812 – "Optimal Control of Reactive Power Compensators in Industrial Networks"

L. Herman I. Papič, *University of Ljubljana, Slovenia*

814 – "Powers Balances in AC Electric Circuit with Nonlinear Load"

M. Wcislik, *Kielce University of Technology, Poland*

815 – "Reduction of SVC Capacity by Flicker Control Using Parallel Band-Pass Filters"

N. Gibo, K. Yukihiro, *Central Research Institute of Electric Power Industry, Japan;*

K. Deno Y. Nagasaka, *Kansai Electric Power Co., Japan*

## **SESSION 2C – Renewable Generation/Distributed Generation and PQ**

**Monday 11:00–13:00**

**Room:** Sala Alabastro B

**Chairman** – I. Wasiak, *Technical University of Lodz, Poland*

1303 – "Point Estimate Schemes for Probabilistic Load Flow Analysis of Unbalanced Electrical Distribution Systems with Wind Farms"

A. Bracale, P. Caramia, *University of Napoli Parthenope, Italy;*

G. Carpinelli, *University of Napoli Federico II, Italy;*

A. Russo, *Polytechnic of Torino, Italy;*

P. Varilone, *University of Cassino, Italy*

1306 – "Measurement of the Flicker Characteristics of Grid Connected Wind Turbines: Instantaneous Frequency versus Instantaneous Phase Estimation Methods"

A. Lazkano, I. Azkarate, J.J. Gutierrez, J. Ruiz, L.A. Leturiondo, P. Saiz, *University of the Basque Country, Spain*

1316 – "On the Robustness of the Distribution Systems against Voltage Dips: the Analytical Assessment for Different Structure Variations"

P. Caramia, *University of Napoli Parthenope, Italy;*

P. Varilone, P. Verde, L. Vitale, *University of Cassino, Italy*

1317 – "Study on Operation of Energy Storage in Electrical Power Microgrid – Modeling and Simulation"

R. Pawelek, I. Wasiak, P. Gburczyk and R. Mienski, *Technical University of Lodz, Poland*

1308 – "Power quality impact of cogeneration modules in urban networks"

M. Baioni, A. Berizzi, C. Bovo, *Politecnico di Milano, Italy*

1309 – "Islanding detection active methods: implementation of simulation models using ATP-EMTP"

D. Menniti, A. Pinnarelli, N. Sorrentino, G. Brusco, *University of Calabria, Italy*

## SESSION 2D – PQ Analysis

**Monday 11:00–13:00**

**Room:** Sala Novelli

**Chairman** – R. Caldon, *Università degli Studi di Padova, Italy*

608 – "Nonlinear Filtering for Power Quality Disturbances Analysis"

A.S. Cerqueira, M.L.G. Salmento, J.V. de Souza, *Federal University of Juiz de Fora, Brazil*;

M.A.A. Lima, D.V. Coury, *University of São Paulo, Brazil*

609 – "Analysis of Power Disturbances from Monitoring Multiple Levels and Locations in a Power System"

C.D. Le, *Chalmers University of Technology, Sweden*;

M.H.J. Bollen, *Luleå University of Technology, Sweden*;

I.Y.H. Gu, *Chalmers University of Technology, Sweden*

612 – "Power Quality Analysis of Electromechanical Energy Conversion: a Budeanu Approach"

F. Della Torre, A. P. Morando, G. Sapienza, *Politecnico di Milano, Italy*

614 – "A New Optimization Technique to Measure Frequency and Harmonics in Power Systems"

I. Sadinezhad, V.G. Agelidis, *University of New South Wales, Australia*

615 – "A New Quasi Newton Filtering Technique for Power System Frequency Estimation and Harmonics/Interharmonics Rejection"

I. Sadinezhad, V.G. Agelidis, *University of New South Wales, Australia*

## SESSION 3 – Monday 14:00–16:00

### SESSION 3A – PQ Monitoring/ Reporting Methodologies & Indices

Monday 14:00–16:00

Room: Sala Alabastro A

Chairman – J.V.Milanović, *University of Manchester, UK*

914 – "Voltage Sags Observation through Optimal Monitor Locations"

F. Salim, K.M. Nor, *Universiti Teknologi Malaysia, Malaysia*

915 – "Analysis of the Complex Voltage Unbalance Factor Behavior Resulting from the Variation of Voltage Magnitudes and Angles"

A.L. Ferreira Filho, J.A. Cormane Angarita, D.C. Garcia, M.V. Chafim Costa, M. de Oliveira, F.A. de Oliveira Nascimento, *University of Brasilia, Brazil*

916 – "Quantifying Voltage Unbalance: Evaluating the Influence of Aggregation Intervals"

A.L. Ferreira Filho, J.A. Cormane Angarita, F.A. de Oliveira Nascimento, T.C Valadares, J.P.J de Oliveira, *University of Brasilia, Brazil*

917 – "Real Time Power Quality Monitoring System according to New Brazilian Regulation Policies"

G.P. Colnago, J.L.F. Vieira, G.C.D. Sousa, *Federal University of Espirito Santo, Brazil*;  
J.R. Macedo, *University of Uberlandia, Brazil*

918 – "On improving accuracy of optimal voltage sag monitoring programmes"

J.M. Avendano–Mora, N.C. Woolley, J.V. Milanović, *University of Manchester, UK*

928 – "A Comparison of Voltage Sag Estimation Algorithms Using Optimal Monitoring Locations"

J.M. Avendano–Mora, N.C. Woolley, J.V. Milanović, *University of Manchester, UK*

## **SESSION 3B – PQ Mitigation Technologies**

**Monday 14:00–16:00**

**Room:** Sala Oggioni

**Chairman** – E. Tironi, *Politecnico di Milano, Italy*

1102 – "Revision of European Standard EN 50160 on Power Quality: Reasons and Solutions"

C. Masetti, *Comitato Elettrotecnico Italiano, Italy*

1103 – "A New Approach for Harmonic Summation Using the Methodology of IEC 61400–21"

F. Medeiros, D.C. Brasil, *Brazilian National Systems Operator, Brazil;*

P.F. Ribeiro, *Calvin College, USA;*

C.A.G. Marques, C.A. Duque, *Federal University of Rio de Janeiro, Brazil*

816 – "An Analysis of Shunt Active Filter Performance Using Multiple Number of Power Switches"

N.F.A. Abdul Rahman, *Universiti Teknologi Mara, Malaysia*

820 – "Active Power Control for Flicker Compensation in Single Phase Welding Machines"

F. Annettoni, *CEA S.p.A., Italy;*

G. Superti-Furga, E. Tironi, S. Toscani, *Politecnico di Milano, Italy*

1505 – "Optimal Regulation of STATCOM Controllers and PSS Parameters Using Hybrid Particle Swarm Optimization"

M. Zarringhalami, *Ghodsniroo Engineering Co., Iran;*

S. M. Hakimi, K. N. Toosi *University of Technology & ICS Company, Iran;*

M. Javadi, *ICS Company, Iran*

## **SESSION 3C – Renewable Generation/Distributed Generation and PQ**

**Monday 14:00–16:00**

**Room:** Sala Alabastro B

**Chairman** – P. Verde, *University of Cassino, Italy*

1304 – "ElectricICT: low voltage loads and generators coordination towards the SmartGrid paradigm"

A. Capone, G. Carello, M. Merlo, *Politecnico di Milano, Italy*

1305 – "Quantification of Voltage Fluctuations Caused by a Wave Farm Connected to Weak, Rural Electricity Networks"

A.J. Nambiar, A.R. Wallace, *University of Edinburgh, Scotland;*

A.E. Kiprakis, *Technological Educational Institute of Crete, Greece*

1314 – "Influence of bus voltage variations on two Maximum Power Point control loops"

K. Martens, B. Meersman, J. De Kooning, B. Renders, T. Vandoorn, L. Vandeveld, *Ghent University, Belgium*

1315 – "Voltage Profile Calculation in Distribution Networks under Sinusoidal and Distorted Operation"

M. Brenna, F. Foiadelli, G. Sapienza, D. Zaninelli, *Politecnico di Milano, Italy*

1320 – "Influence of Power Control Strategies on the Voltage Profile in an Islanded Microgrid"

T.L. Vandoorn, L. Vandeveld, B. Meersman, *Ghent University, Belgium;*

T. Loix, J. Driesen, *K.U.Leuven ESAT/ELECTA, Belgium*

1322 – "A Control Algorithm of Power Converters in Smart-Grids for Providing Uninterruptible Ancillary Services"

L. Piegari, *Politecnico di Milano, Italy;*

P. Tricoli, *Università di Napoli Federico II, Italy*

## **SESSION 3D – PQ Analysis**

**Monday 14:00–16:00**

**Room:** Sala Novelli

**Chairman** – J.P.G. de Abreu, *Itajubá Federal University, Brazil*

613 – "Time–Domain Quasi–synchronous Sampling Algorithm for Harmonic Analysis"

F. Zhou, Z.Y. Huang, C.Y. Zhao, D.Y. Chen, *Shanghai Jiao Tong University, China*

616 – "Time–domain formulation for apparent power using collective rms and polar coordinates"

J.E.L. de Almeida, P.M. da Silveira, H. Arango, M.F.C. Parentoni, J.P.G. de Abreu, *Itajubá Federal University, Brazil*

617 – "Wye Apparent Power – An Alternative Proposal"

J.E.L. de Almeida, P.M. da Silveira, H. Arango, M.F.C. Parentoni, J.P.G. de Abreu, *Itajubá Federal University, Brazil*

620 – "Electrical Losses Calculation under Nonideal Conditions Computational versus Experimental Analysis"

M.F. C. Parentoni, J.P.G. de Abreu, F.N. Belchior, *Itajubá Federal University, Brazil*

625 – "The Application of the Double Domain Simulation with PWM Controlled Locomotives"

P. Kiss, G.G. Balázs, A. Dán, I. Schmidt, *Budapest University of Technology and Economics, Hungary*

## SESSION 4 – Monday 16:30–18:30

### SESSION 4A – PQ Monitoring/ Reporting Methodologies & Indices

Monday 16:30–18:30

Room: Sala Alabastro A

Chairman – E. Pagano, *Università di Napoli Federico II, Italy*

920 – "Evaluation and Identification of Critical Zones due to Sag Activity"

L.E. Luna, L.E. Gallego, M. Romero Luis Ernesto Luna Ramirez, *National University of Colombia, Colombia*

921 – "Reliable Power Disturbance Detection using Wavelet Decomposition or Harmonic Model based Kalman Filtering"

M. Caujolle, *Electricité de France, France;*

M. Petit, G. Fleury, L. Berthet, *SUPELEC Systems Sciences, France*

924 – "Qualitative Analysis for the Automatic Monitoring of Short–Duration Voltage Events"

M. Oleskovicz, D.V. Coury, *University of Sao Paulo, Brazil;*

W.F. Usida, *Brazilian Electricity Regulatory Agency, Brazil;*

L.C.P. Rodrigues, *Latin American Logistic, Brazil*

926 – "A new methodology for the comparative analysis of sags among substations in a distribution network in Colombia"

M. Romero, A. Pavas, G. Cajamarca, L.E. Gallego, *Universidad Nacional of Colombia, Colombia*

927 – "Implementation of a Real–Time Remote Power Quality Monitoring System by Dual Microprocessors"

M.T. Chen, C.W. Lu, *National Kaohsiung University of Applied Sciences, Taiwan*

929 – "Monitoring Intelligent Distribution Power Systems – a Power Quality Plan"

N.R. Browne, *Integral Energy, Australia;*

T.J. Browne, *PSC, Australia;*

S. Elphick, *University of Wollongong, Australia*

## **SESSION 4B – Transients – Propagation, Measurement & Modeling**

**Monday 16:30–18:30**

**Room:** Sala Oggioni

**Chairman** – C. A. Nucci, *Università di Bologna, Italy*

1501 – "New Modeling of Electrical Power Networks Using Fractal Geometry"

A. Amrane, N. Retiere, D. Riu, *Grenoble Electrical Engineering Laboratory, France*

1502 – "A New Model of Multiconductor Transmission Lines for Time Domain Transient Analysis"

J.C. Escamilla, P. Moreno, J.L. Naredo, *CINVESTAV, Mexico*

1503 – "Reduced Harmonic State Space Model of TCR"

J.R.C. Orillaza, A.R. Wood, *University of Canterbury Christchurch, New Zealand*

1504 – "Identification of Electric Power Parameters of AC Arc Furnace Low Voltage System"

K. Jagieła, J. Rak, M. Gała, M. Kępiński, *Technical University of Częstochowa, Poland*

1506 – "Updating Stochastic Models of Arc Furnace Reactive Power by Genetic Algorithm"

M.E.H. Golshan, *Isfahan University of Technology, Iran;*

H. Samet, *Shiraz University, Iran*

1507 – "Shape Optimization of Electromagnet"

S. Zajaczek, L. Skřivánek, L. Ivánek, *VŠB–Technical University of Ostrava, Czech Republic*

## **SESSION 4C – PQ Case Studies**

**Monday 16:30–18:30**

**Room:** Sala Alabastro B

**Chairman** – S. Kilyeni, *"Politehnica" University of Timisoara, Romania*

708 – "Power Quality Monitoring for Electric Substation Ancillary Services Supplying"

N. Chiosa, *Romanian Power Grid Company "Transelectrica", Romania;*

S. Kilyeni, C. Barbulescu, D. Jigoria–Oprea, *"Politehnica" University of Timisoara, Romania*

709 – "Unconventional Sources for Electric Substation Ancillary Services Power Supply"

O. Prostean, C. Barbulescu, G. Vuc, I. Borlea, *"Politehnica" University of Timisoara, Romania*

710 – "Aging of Distribution Transformers due to Harmonics"

R. Singh, *Jalpur Engineering College, India;*

A. Singh, *Gyan Ganga Institute of Technology and Sciences, India*

711 – "Power Quality in a system of satellite tracking"

T.I.R. de Carvalho Malheiro, *Federal Institute of Education, Science and Tecnology of Mato Grosso, Brazil ,*

A.B. de Vasconcellos, B.C. Carvalho, J.A. Lambert, A.V. Festa, T.V. da Silva, *Federal University of Mato Grosso, Brazil*

631 – "Effect of Primary High Voltage Supply Lines on the High Speed AC Railways Systems"

A. Dolara, M. Gualdoni, S. Leva, *Politecnico di Milano, Italy*

## SESSION 4D – PQ Analysis

**Monday 16:30–18:30**

**Room:** Sala Novelli

**Chairman** – S. Leva, *Politecnico di Milano, Italy*

624 – "Gabor Transform, Gabor–Wigner Transform and SPWVD as a Time–Frequency Analysis of Power Quality"

M. Szmajda, K. Górecki, *Opole University of Technology, Poland;*

J. Mroczka, *Wrocław University of Technology, Poland*

626 – "Application of Pulse Multiplication in Autotransformer Based AC–DC Converters for Direct Torque Controlled Induction Motor Drives"

S. Nakhaie, A. Jalilian, *Iran University of Science and Technology, Iran*

628 – "Analysis of Power Quality in a system of relay TV"

T.I.R. de Carvalho Malheiro, *Federal Institute of Education, Science and Tecnology of Mato Grosso, Brazil;*

A.B. de Vasconcellos, B.C. Carvalho, A.T. da Silva, F.L. Gomes, A.V. Festa, *Federal University of Mato Grosso, Brazil*

629 – "Interference Between Electric Traction Supply Network and Distribution Power Network – Resonance Phenomenon"

V. Kolar, J. Palecek, S. Kocman, T. Trung Vo, P. Orsag, V. Styskala, R. Hrbac, *VŠB–Technical University of Ostrava, Czech Republic*

403 – "A PSO–Based Approach to Adjust CPSO Parameters"

I. Ziari, A. Jalilian, *Iran University of Science and Technology, Iran*

## SESSION 5 – Tuesday 8:30–10:00

### SESSION 5A – Economic Impacts of PQ

Tuesday 8:30–10:00

Room: Sala Alabastro A

Chairman – W. A. Moncrief, *EnerNex Corporation, USA*

103 – "The Influence of Quality on the Creation of Economic Value in Electricity Markets"

H. Arango, J.P.G. de Abreu, B.D. Bonatto, *Itajubá Federal University, Brazil*;

C.M. Vieira Tahan, N. Kagan, M.R. Gouvea, *University of São Paulo, Brazil*

104 – "On the billing of Electrical Energy Flows at Prosumers' Busbar"

R. Carbone, *University "Mediterranea" of Reggio Calabria, Italy*;

R. Langella, A. Testa, *Seconda Università di Napoli, Italy*

105 – "Optimal Capacitor Placement and Sizing in Distorted Radial Distribution Systems  
Part I: System Modeling and Harmonic Power Flow Studies"

A. A. Eajal, *University of Sirte, Libya*;

M.E. El-Hawary, *Dalhousie University, Canada*

106 – "Optimal Capacitor Placement and Sizing in Distorted Radial Distribution Systems  
Part II: Problem Formulation and Solution Method"

A. A. Eajal, *University of Sirte, Libya*;

M.E. El-Hawary, *Dalhousie University, Canada*

107 – "Optimal Capacitor Placement and Sizing in Distorted Radial Distribution Systems  
Part III: Numerical Results"

A. A. Eajal, *University of Sirte, Libya*;

M.E. El-Hawary, *Dalhousie University, Canada*

## **SESSION 5B – Smart Grids for PQ**

**Tuesday 8:30–10:00**

**Room:** Sala Oggioni

**Chairman** – E.O.A. Larsson, *Luleå University of Technology, Sweden*

1401 – "A Token Ring Procedure for Distributed Co-ordinated Regulation of Active MV Networks"

L. Carradore, R. Turri, *University of Padova, Italy*

1402 – "Real Time Simulation of Smart Grids for Interface Protection Test and Analysis"

M. Brenna, G. Sapienza, D. Zaninelli, *Politecnico di Milano, Italy;*

E. De Berardinis, L. Delli Carpini, P. Paulon, P. Petroni, G. Scrosati, *Enel Distribuzione, Italy*

1403 – "Transient analysis of DG interfaced low voltage dc system"

G.C. Lazaroiu, M.O. Popescu, O. Ghita, V. Dumbrava, *University POLITEHNICA of Bucharest, Romania;*

E. Tironi, *Politecnico di Milano, Italy*

1404 – "Hosting Dispersed Generation on Italian MV networks: towards smart grids"

M. Delfanti, M. Merlo, G. Monfredini, V. Olivieri, M. Pozzi, A. Silvestri, *Politecnico di Milano, Italy;*

1405 – "WAMS applications for intelligent network quality management"

G. Leidi, A. Miotti, *Siemens SpA, Italy*

## **SESSION 5C – PQ Case Studies**

**Tuesday 8:30–10:00**

**Room:** Sala Alabastro B

**Chairman** – R. Langella, *Seconda Università di Napoli, Italy*

701 – "Power Quality in Public Lighting Systems"

A. Dolara, R. Faranda, S. Guzzetti, S. Leva, *Politecnico di Milano, Italy*

703 – "Evaluation of Harmonic Current Reduction for the Purpose of Energy Savings – A Case Study"

J. Sanguinetti, Y. Baghzouz, *University of Nevada at Las Vegas, USA*

705 – "Real Experience Using Power Quality Data to Improve Power Distribution Reliability"

L.A. Irwin, *Schneider Electric, USA*

712 – "Harmonic summation in power systems with power electronic interfaced loads"

N. Golovanov, G.C. Lazaroiu, *University POLITEHNICA of Bucharest, Romania;*

M. Roscia, *University of Bergamo, Italy;*

D. Zaninelli, *Politecnico di Milano, Italy*

## **SESSION 5D – PQ Analysis, Interference and Immunity**

**Tuesday 8:30–10:00**

**Room:** Sala Novelli

**Chairman** – A. F. Zobaa, *Brunel University, UK*

202 – "An Investigation of the Response of Incandescent Lamps and Compact Fluorescent Lamps to Voltage Fluctuations"

C. May, E.R. Collins, *Clemson University, USA*

622 – "A laboratory for time–frequency analysis of power quality disturbances using wavelets"

M. de Apraiz, J. Barros, R.I. Diego, *University of Cantabria, Spain*

301 – "Characterizing the Harmonic Attenuation Effect of High–Pressure Sodium Lamps"

A. Gil–de–Castro; A. Moreno–Munoz, J.J.G. de la Rosa, *University of Cordoba, Spain*;

302 – "Harmonics and Resonances in the Low Voltage Grid Caused by Compact Fluorescent Lamps"

A.S. Koch, J.M.A. Myrzik, *Dortmund University of Technology, Germany*;

T. Wiesner, L. Jendernalik, *RWE, Germany*

## SESSION 6 – Tuesday 10:30–12:00

### SESSION 6A – PQ Standards + PQ State Estimation

Tuesday 10:30–12:00

Room: Sala Alabastro A

Chairman – S. Perera, *University of Wollongong, Australia*

1104 – "Impacts of modifications of standards on the power quality measurement results"

S. Bhattacharyya, J.F.G. Cobben, W.L. Kling, *Eindhoven University of Technology, Netherlands*

1201 – "A Review of Recent Investigations with Reference to IEC/TR 61000–3–13 on Voltage Unbalance Emission Allocation"

P. Paranavithana, *Transpower New Zealand Limited, New Zealand*;

U. Jayatunga, S. Perera, P. Ciufu, *University of Wollongong, Australia*;

627 – "On the assessment of voltage unbalance"

T.E. Seiphetlho, A.P.J. Rens, *North West University, South Africa*

101 – "Harmonic Domain Modeling of Transformer Nonlinear Characteristic with Piece – Wise Aproximation"

A. Damnjanovic, A. Islam, A. Domijan, *University of South Florida, USA*

## **SESSION 6B – Interharmonics & Other Non-Harmonic Distortion**

**Tuesday 10:30–12:00**

**Room:** Sala Oggioni

**Chairman** – A. Testa, *Seconda Università di Napoli, Italy*

501 – "Measurement result from 1 to 48 fluorescent lamps in the frequency range 2 to 150 kHz"

E.O.A. Larsson, M. H. J. Bollen, *Luleå University of Technology, Sweden*

502 – "On the Effects of Interharmonic Distortion on Static Converters Controlled by means of PLL Systems"

R. Langella, P. Marino, G. Raimondo, L. Rubino, N. Serbia, A. Testa, *Seconda Università di Napoli, Italy*

503 – "New Phasor Estimator in the Presence of Harmonics, DC Offset, and Interharmonics"

R. Vianello, M. O. Prates, C.A. Duque, A.S. Cequeira, *Federal University of Juiz de Fora, Brazil;*

P.M. da Silveira, *Itajubá Federal University, Brazil;*

P.F. Ribeiro, *Calvin College, USA*

505 – "An Equivalent Model Of A Single-Phase Load Under Non-Sinusoidal Conditions"

V. Kolar, P. Orsag, J. Kijonka, *VŠB-Technical University of Ostrava, Czech Republic*

## **SESSION 6C – Renewable Generation/Distributed Generation and PQ**

**Tuesday 10:30–12:00**

**Room:** Sala Alabastro B

**Chairman** – S. Barcón, *Arteche Inelap SA de CV, Mexico.*

1302 – "Control of Islanded Inverter Interfaced Distributed Generation Units for Power Quality Improvement"

A.A. Ghadimi, *Arak University, Iran;*

F. Razavi, *Islamic Azad University, Iran;*

R. Ghaffarpour, *Tafresh University, Iran*

1321 – "Differential Evolutionary Algorithms in Optimal Distributed Generation Location"

C. Bulac, F. Ionescu, *University POLITEHNICA of Bucharest, Romania;*

M. Roscia, *University of Bergamo, Italy*

1323 – "Divergence Operator for the Stability Assessment of a Microgrid Weakly Connected to the Power System"

D. Falabretti, M. Delfanti, M. Merlo, *Politecnico di Milano, Italy;*

J.M. Zaldívar, *Joint Reserach Centre "European Commission", Italy;*

F. Strozzi, *Carlo Cattaneo University, Italy*

1324 – "Dispersed generation in MV networks: performance of anti-islanding protections"

M. Delfanti, D. Falabretti, M. Merlo, G. Monfredini, V. Olivieri, *Politecnico di Milano, Italy*

## **SESSION 6D – Impact of PQ on Systems and Equipment**

**Tuesday 10:30–12:00**

**Room:** Sala Novelli

**Chairman** – G. Carpinelli, *University of Napoli Federico II, Italy*

401 – "Studying the Effects of Using Compact Fluorescent Lamps in Power Systems"

A. H. Jahanikia, *Mefragh Company, Iran;*

M. Abbaspour, *Queen's University Belfast, UK*

404 – "Influence of Harmonic Currents on Cable Losses for Different Grid Configurations"

J. Desmet, G. Vanalme, C. Debruyne, *Technical University HoWest, Belgium;*

L. Vandeveldel, *Ghent University, Belgium*

406 – "Harmonics monitoring survey on office LV appliances"

M.C. Falvo, U. Grasselli, R. Lamedica, *University of Rome "Sapienza", Italy;*

A. Prudenzi, *University of L'Aquila, Italy*

821 – "Effect of Harmonic Pollution on Low Voltage Overcurrent Protection"

A. Fidigatti, E. Ragaini, *ABB SpA;*

## SESSION 7 – Wednesday 8:30–10:30

### SESSION 7A – PQ Monitoring/ Reporting Methodologies & Indices

Wednesday 8:30–10:30

Room: Sala Alabastro A

Chairman – A. Berizzi, *Politecnico di Milano, Italy*

930 – "Impact of Long and Short-time Voltage Variations on the PST and Voltage Unbalance Indicators"

O.J. Murillo, A.M. Blanco, L.E. Gallego, *National University of Colombia, Colombia*

931 – "Fault–Pattern Discovery in Sequences of Voltage Sag Events"

O. Quiroga, J. Meléndez, S. Herraiz, *University of Girona, Spain*

932 – "Merging of various Indicators and Levels of Disturbances for optimized Power Quality Characterization"

P. Janik, Z. Waclawek, *University of Technology, Poland*

933 – "Voltage dips performance characterization by PQ indices at national and macro area level"

R. Chiumeo, M. de Nigris, C. Gandolfi, L. Garbero, L. Tenti, *ERSE, Italy*

934 – "A Survey of Techniques Applied to Non-stationary Waveforms in Electrical Power Systems"

R.P. Rodrigues, *Itajubá Federal University, Brazil;*

P.M. Silveira, *Itajubá Federal University, Brazil;*

P.F. Ribeiro, *Calvin College, USA*

913 – "Application of Low Voltage Circuit Breakers to Power Quality Monitoring"

E. Ragaini, *ABB, Italy*

## **SESSION 7B – Harmonics Generation & Propagation**

**Wednesday 8:30–10:30**

**Room:** Sala Oggioni

**Chairman** – A.E. Emanuel, *Worcester Polytechnic Institute, USA*

303 – "Harmonic Cancellation of Modern Switch–Mode Power Supply Load"

A.J. Collin, S.Ž. Djokić, *University of Edinburgh, Scotland;*

C.E. Cresswell, *REpower UK, Scotland*

304 – "Magnetizing Current Harmonics, Interharmonics and Subharmonics: An Analytical Study"

A.E. Emanuel, M. Humi, *Worcester Polytechnic Institute, USA*

305 – "Effects of High Penetration of CFLs and LEDs on the Distribution Networks"

A.M. Blanco Castañeda, E. Parra, *National University of Colombia, Colombia*

306 – "Introducing Power System Voltage Droop as a New Concept for Harmonic Current Allocation"

R.A. Barr, *Electric Power Consulting, Australia;*

V.J. Gosbell, *University of Wollongong, Australia*

307 – "Higher harmonics transfer through 110kV/400kV transformer"

G. Blajszczak, *PSE–Operator S.A., Poland*

314 – "Harmonic Allocation Following IEC Guidelines Using the Voltage Droop Concept"

R.A. Barr, *Electric Power Consulting, Australia;*

V.J. Gosbell, *University of Wollongong, Australia*

## **SESSION 7C – PQ Propagation, Measurements & Modeling**

**Wednesday 8:30–10:30**

**Room:** Sala Alabastro B

**Chairman** – S.K. Rönnerberg, *Luleå University of Technology, Sweden*

1001 – "Power Components in a Circuit under Nonsinusoidal Conditions"

A.M. Osnach, *Institute of Electrodynamics, Ukraine*

1002 – "Method of Disturbances Interaction: Novel approach to assess responsibilities for steady state power quality disturbances among customers"

Andres Pavas, *Universidad Nacional of Colombia, Colombia*

1003 – "A novel approach for the simulation of power quality stationary disturbances in electric power systems"

A. Pavas, H. Torres–Sanchez, *Universidad Nacional of Colombia, Colombia;*

V. Staudt, *Ruhr University of Bochum, Germany*

1004 – "Harmonic Coupled Norton Equivalent Model for Modeling Harmonic–Producing Loads"

C.F.M. Almeida, N. Kagan, *University of Sao Paulo, Brazil*

1005 – "Real–Time Measurement of Power Quantities in Fully Distorted Systems"

H. Dalvand, V.G. Agelidis, *University of New South Wales, Australia*

1006 – "From Power Quality Monitoring to Transient Stability Analysis: Measurement–based Load Modeling for Dynamic Simulations"

I.F. Visconti, L.F.W. de Souza, J.M.S.C. Costa, N.R.B.C. Sobrinho, *CEPEL, Brazil*

## **SESSION 7D – Impact of PQ on Systems and Equipment**

**Wednesday 8:30–10:30**

**Room:** Sala Novelli

**Chairman** – R. Ottoboni, *Politecnico di Milano, Italy*

- 407 – "Evaluation of Power Transformers Design for Feeding Nonlinear Loads – Comparison between Theory and Practice Tests"  
M.F.C. Parentoni, J.P.G. de Abreu, F.N. Belchior, *Itajubá Federal University, Brazil*
- 408 – "Design Proposition of Transformers Used for Feeding Nonlinear Loads – A Practical Approach Based on Temperature Measurement"  
M.F.C. Parentoni, J.P.G. de Abreu, F.N. Belchior, *Itajubá Federal University, Brazil*
- 409 – "On Harmonics from a Power Transformer Used in the Excitation Circuit of a Power Group"  
P. M. Nicolae, I. D. Nicolae, *University of Craiova, Romania*
- 410 – "Assessment of the impacts of voltage dips for a MV customer"  
S. Bhattacharyya, J.F.G. Cobben, W.L. Kling, *Eindhoven University of Technology, Netherlands*
- 411 – "Laboratory Investigation of the Input Current Characteristics of Modern Domestic Appliances for Varying Supply Voltage Conditions"  
S. Elphick, P. Ciufu, S. Perera, *University of Wollongong, Australia*
- 412 – "Operation of a transmission system of FM radio Facing the Energy Supply"  
T.I.R. de Carvalho Malheiro, *Federal Institute of Education, Science and Tecnology of Mato Grosso, Brazil;*  
A.B. de Vasconcellos, F.L. Gomes, A.A.C. Bozz, T.V. da Silva, B.C. Carvalho, *Federal University of Mato Grosso, Brazil;*  
R.S. de Barros, *State University of Campinas, Brazil*

## SESSION 8 – Wednesday 11:00–13:00

### SESSION 8A – PQ Monitoring/ Reporting Methodologies & Indices

Wednesday 11:00–13:00

Room: Sala Alabastro A

Chairman – T.H. Ortmeier, *Clarkson University, USA*

937 – "Analysis of the relation between voltage sags severity and fault characteristics"

T.C. de Oliveira, J.M. de Carvalho Filho, G.T. Watanabe, J.P.G. de Abreu, *Itajubá Federal University, Brazil*;

R.C. Leborgne, *Federal University of Rio Grande do Sul, Brazil*;

J.F. de Oliveira, *CEMIG, Brazil*

938 – "A Unified Index for Power Distribution Reliability/Power Quality Indices"

T.H. Ortmeier, *Clarkson University, USA*

939 – "Feature Characterization of Power Quality Events According to Their Underlying Causes"

V.B. Núñez, J. Meléndez, *University of Girona, Spain*;

I.Y.H. Gu, M.H.J Bollen, *Chalmers University of Technology, Sweden*

940 – "SVM–Based Classification Methodology for Overhead Distribution Fault Events"

V.B. Núñez, J. Meléndez, *University of Girona, Spain*;

S. Kulkarni, S. Santoso, *University of Texas at Austin, USA*

942 – "Application of a New Combined Technique to Power Quality Events Classification"

Z. Moravej, M. Pazoki, A. A. Abdoos, *Semnan University, Iran*

201 – "Introducing a voltage dip severity index (a proposal)"

A.M. Dán, *Budapest University of Technology and Economics, Hungary*

## SESSION 8B – Harmonics Generation & Propagation

Wednesday 11:00–13:00

Room: Sala Oggioni

Chairman – M.H.J. Bollen, *Luleå University of Technology, Sweden*

308 – "A Different Approach for Visualizing Harmonic Current Components in Multi-Converter Systems"

H.S. Bronzeado, *Companhia Hidro Elétrica do São Francisco, Brazil;*

J.C. de Oliveira, *Federal University of Uberlandia, Brazil;*

M.D. Teixeira, *Institute of Technology for Development, Brazil*

309 – "Harmonic Load Flow Method for Radial Distribution Networks"

I. Archundia–Aranda, R.O. Mota–Palomino, *National Polytechnic Institute of México, Mexico*

311 – "A Method of Dynamic Resampling for DFT–Based Harmonic Analysis under Time–Varying Frequency Conditions"

M.A.A. Lima, J.R. de Carvalho, D.V. Coury, *University of São Paulo, Brazil;*

A.S. Cerqueira, C.A. Duque, *Federal University of Juiz de Fora, Brazil*

313 – "Method for Determining Customer Contribution to Harmonic Variations in a Large Power Network"

N.P. KandeV, S. Chénard, *Hydro–Quebec, Canada*

316 – "Harmonic emission before and after changing to LED and CFL – Part I: laboratory measurements for a domestic customer"

S.K. Rönnberg, M. Wahlberg and M.H.J. Bollen, *Luleå University of Technology, Sweden*

315 – "Harmonic Emission before and after Changing to LED and CFL – Part II: Field Measurements for a Hotel"

S.K. Rönnberg, M. Wahlberg and M.H.J. Bollen, *Luleå University of Technology, Sweden*

## **SESSION 8C – PQ Propagation, Measurements & Modeling**

**Wednesday 11:00–13:00**

**Room:** Sala Alabastro B

**Chairman** – G.W. Chang, *National Chung Cheng University, Taiwan*

1007 – "Aluminum Electrolytic Capacitor Lifetime Analysis under Voltage Fluctuations"

K. Zhao, P. Ciufo, S. Perera, *University of Wollongong, Australia*

1009 – "Frequency Responses of MV voltage transformers in the range of 50 Hz to 10 kHz"

M. Klatt, J. Meyer, P. Schegner, *Technische Universitaet Dresden, Germany*

M. Elst, *RITZ Instrument Transformers GmbH, Germany*

1010 – "Network Flicker Levels due to Simultaneous Operation of Two Arc Furnaces"

M. Maksic, I. Papic, *University of Ljubljana, Slovenia*

1011 – "Modelling VSI–Fed ASDs by Matlab/Simulink for Harmonic and Interharmonic Assessment"

S.K. Chen, *Chung Chou Institute of Technology, Taiwan;*

H.J. Su, G.W. Chang, *National Chung Cheng University, Taiwan*

1012 – "A Grid Harmonic Summation Method Based on the Probability Assessment of Harmonic Phase Angles"

Y. Xiao, *China Southern Power Grid, China;*

X. Yang, *Electricité de France, France*

1013 – "Combined, experimental data supported simulations in development of power grid impedance identification methods"

Z.T. Staroszczyk, *Warsaw University of Technology, Poland*

## **SESSION 8D – Transmission and distribution System Planning**

**Wednesday 11:00–13:00**

**Room:** Sala Novelli

**Chairman** – S. Massucco, *University of Genova, Italy*

1607 – "Impact Evaluation of Plug-in Electric Vehicles (PEV) on Electric Distribution Networks"

M. De Nigris, I. Gianinoni, *ERSE, Italy*;

S. Grillo, S. Massucco, F. Silvestro, *University of Genova, Italy*

817 – "D-STATCOM control system and operation in a configuration of Premium Power Park"

C. Gandolfi, R. Chiumeo, *ERSE, Italy*

1602 – "A Fuzzy-Based Algorithm for Shunt Capacitor Planning in a Distorted Power System"

D.Y. Shih, G.W. Chang, G.S. Chuang, H.L. Wang, S.Y. Chu, *National Chung Cheng University, Taiwan*

1608 – "Optimal Capacitor Placement and Sizing in Non-Radial Distribution to Improve Power Quality"

S. M. Hakimi, S.M. Moghaddas Tafreshi, K. N. Toosi *University of Technology, Iran*;

M. Zarringhalami, *Ghodsniroo Engineering Co, Iran*

1606 – "Reactive Planning Considering Offshore Wind Power Generation"

J. Allahdadian, C. Bovo, V. Ilea, A. Berizzi, *Politecnico di Milano, Italy*

## POSTER SESSION – Tuesday 12:00–13:15

**Room:** Sala Stucchi

**Chairman** – P.M. da Silveira, Itajubá Federal University – Power Quality Study Group, Brazil

102 – "Optimal Location Finding of TCSC for Loss Reduction in Transmission Lines with GA"

H. Jalili, *University of Mashhad, Iran*

203 – "Process Immunity Time". Assessment of its Practicability in Industry"

K. Van Reusel, W. Driessens, *University of Leuven, Belgium*

K. Stockman, *University College Howest, Belgium*

310 – "The Problems of Centralized Decrease of Harmonic Voltages in the HV Networks with Distributed Nonlinear Loads"

L. I. Kovernikova, *Melentiev Energy Systems Institute SB RAS, Russia*

312 – "Now Twelve Step Inverter (TSI) Using Six Step Inverter (SSI) Structure with Low THD"

M. Arehpanahi, *Tafresh University of Technology, Iran;*

M.M. Shahbazi, *Isfahan University of Technology, Iran*

317 – "Elimination of Harmonics Using Multi–Pulse Rectifiers"

S. Kocman, V. Kolar, T. Trung Vo, *VŠB–Technical University of Ostrava, Czech Republic*

318 – "Eighteen–Pulse Rectifiers for Harmonic Mitigation"

S. Kocman, V. Kolar, T. Trung Vo, *VŠB–Technical University of Ostrava, Czech Republic*

319 – "An Analysis of Diversity Factors applied to Harmonic Emission Limits for Energy Saving Lamps"

V. Čuk, J.F.G. Cobben, W.L. Kling, *Eindhoven University of Technology, Netherlands*

R.B. Timens, *University of Twente, Netherlands*

402 – "Analysis of Distribution Transformer Losses and Life Expectancy using Measured Harmonic Data"

D. M. Said, K. M. Nor, M. S. Majid, *Universiti Teknologi Malaysia, Malaysia*

610 – "Rotating Vectors for the Formulation of Energetic Balances under Periodic Conditions"

F. Della Torre, A. P. Morando, G. Sapienza, *Politecnico di Milano, Italy*

611 – "Cisoidal Algebra: Some Meanings for a Unified Energetic Balance"

F. Della Torre, A. P. Morando, G. Sapienza, *Politecnico di Milano, Italy*

606 – "Improvement of wavelet based methods for classification of power quality disturbances"

- A. Milchevski and D.Taskovski, *Ss Cyril and Methodius University, R. Macedonia*
- 618 – "Discrete Wavelet Transform based Expert System for Power Quality Disturbance Classification"  
 K. Kalaiselvi, *Sethu Institute of Technology, India*;  
 V. Suresh Kumar, *Thiagarajar College of Engineering, India*
- 621 – "Experimental Analysis of the Electrical Losses under Nonsinusoidal Conditions: Is the Fourier Series Really Applicable?"  
 M.F.C. Parentoni; J.P.G. de Abreu; F.N. Belchior, *Itajubá Federal University, Brazil*
- 623 – "Analysis and Design of a 4.8–GHz CMOS Quadrature VCO"  
 M. Niyakan Lahiji, M. Rahnama, A. Moradi Kordalivand, *Arak Islamic Azad University, Iran*
- 632 – "Impact of Harmonic Filters in MV Primary Distribution Systems"  
 G. Esposito, F. Foiadelli, *Politecnico di Milano, Italy*  
 M. Roscia, *University of Bergamo, Italy*;
- 702 – "Heat Dissipation Improvement for ZnO Based Varistors"  
 F.M. Frigura–Iliasa, D. Vatau, L.N. Mihet–Popa, C. Barbulescu, *"Politehnica" University of Timisoara, Romania*
- 704 – "Harmonic Distortion in the Grid Connected Wind Electric Generators: A Case Study"  
 K. Kalaiselvi, *Sethu Institute of Technology, India*;  
 V. Suresh Kumar, *Thiagarajar College of Engineering, India*
- 706 – "Protection Selectivity Analysis in Electric System for Hospital Application. Part I: radial and loop distribution"  
 M. Brenna, F. Foiadelli, D. Zaninelli, *Politecnico di Milano, Italy*
- 707 – "Protection Selectivity Analysis in Electric System for Hospital Application. Part II: new protection proposal for PQ improvement"  
 M. Brenna, F. Foiadelli, D. Zaninelli, *Politecnico di Milano, Italy*
- 803 – "Digital Implementation of Harmonics Reduction of Three–phase Boost Rectifier"  
 A.M. Eltamaly, A.I. Alolah, *King Saud University, Saudi Arabia*
- 805 – "A Hybrid Active Var Compensator HAVarC"  
 C.H. da Silva, R.R. Pereira, L.E.B. da Silva, G.L. Torres, R.B. Gonzatti, *Itajubá Federal University, Brazil*
- 806 – "Charging and Regulating the DC Link Voltage of Hybrid Active Series Power Filters"  
 C.H. da Silva, R.R. Pereira, L.E.B. da Silva, G.L. Torres, R.B. Gonzatti, *Itajubá Federal University, Brazil*
- 908 – "Electric Substation Ancillary Services Power Consumption Analysis. Case study: Timisoara 400/220/110 kV Substation"

- C. Barbulescu, S. Kilyeni, D. Jigoria–Oprea, *"Politehnica" University of Timisoara, Romania*;  
N. Chiosa, *Romanian Power Grid Company "Transelectrica", Romania*
- 919 – "Genetic Algorithms applied for the Optimal Allocation of Power Quality Monitors in Distribution Networks"  
J.C. Cebrian, C. F. M. Almeida, N. Kagan, *University of São Paulo, Brazil*
- 922 – "On the Validity of Harmonic Source Detection Methods and Indices"  
M.E. Balci, *Balikesir University, Turkey*;  
M.H. Hocaoglu, *Gebze Institute of Technology, Turkey*
- 923 – "Power System Harmonic State Estimation using WLS and SVD; A practical Approach"  
M. Moghadasian, H. Mokhtari, A. Baladi, *Amirkabir University of Technology, Iran*;
- 925 – "Network Power Quality Monitoring System"  
M. Wciślik, R. Kazała, M. Łaskawski, *Kielce University of Technology, Poland*
- 935 – "Numerical Observability Analysis of Distribution Systems"  
R. Gelagaev, P. Vermeyen, J. Driesen, *ESAT/Research Group, Belgium*  
J. Vandewalle, *Katholieke Universiteit Leuven, Belgium*
- 941 – "Recognition and Classification of Power Quality Disturbances Using Mutual Information and Probabilistic Neural Network"  
Z. Moravej, M. H. Velayati, M. R. Ansari, *Semnan University, Iran*
- 1008 – "A Current resolution for Fast Measurement of Power Resolutions in Non Sinusoidal Single Phase Systems"  
M.E. Balci, *Balikesir University, Turkey*;  
M.H. Hocaoglu, *Gebze Institute of Technology, Turkey*
- 1307 – "Control of Three Phase Grid Connected Photovoltaic Power System"  
A.S. Khalifa, E.F. El–Saadany, *University of Waterloo, Canada*
- 1312 – "Optimization of Distributed Generation Location and Capacity for Improving Voltage Profile and Reducing Loss Using Genetic Algorithm (SPEA) Proposing a New Index"  
H. Jalili, A.R. Karamizadeh, M.J. Foroughi, M. Jadidoleslam, *University of Mashhad, Iran*;
- 1609 – "Optimal Number and Location of Area Operation Centers (AOC's) in IRAN Power Network according to Index of Generation and Consumption Balance"  
F. Razavi, S.S.K. Madahi, S.A. Araghi, *Islamic Azad University, Iran*
- 1610 – "Transmission Cost Allocation Based on Power Flow Tracing Using Z Bus Matrix"  
S. Kilyeni, O. Pop, G. Prostean, C. Craciun, *"Politehnica" University of Timisoara, Romania*





