

AMPS 2018 9TH IEEE International Workshop on Applied Measurements for Power Systems



**2018
WORKSHOP
PROGRAM**

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Message from the Chairmen

IEEE AMPS 2018, sponsored by the IEEE Instrumentation and Measurement Society and organized by the TC39 "Measurements in Power Systems", is the 9th edition of the IEEE International workshop on Applied Measurements for Power Systems.

This year, after seven editions hosted by E.ON Energy Research Center RWTH at Aachen University, Aachen (Germany), and one hosted by the University of Liverpool, the workshop moves to Bologna (Italy).

Building on its successful history, AMPS continues to represent a unique place for academia and industry to discuss measurement issues that are becoming more and more important in modern electric power systems, as confirmed by the growing number of papers published on this subject. The promotion of a fruitful interaction between all the relevant stakeholders is indeed the primary goal of the workshop, with the aim of exchanging knowledge, informing new research activities and facilitating the impact of research outcomes on present and future technology.

The papers presented in these proceedings have been divided into ten homogeneous technical oral sessions: two sessions are dedicated to Phasor Measurement Units and synchronization techniques; two sessions deal with voltage and current sensors along with relevant characterization techniques; two sessions deal with power system harmonics and another one considers measurements related to other power quality issues; two sessions concern measurements on power system components; one session is dedicated to grid monitoring and fault detection. In addition, for the first time a small poster session has been organized, for a more direct interaction between authors and attendees.

As usual, we hope this workshop will represent a qualified forum for highlighting problems, proposing solutions and, more in general, providing contributions to the advancement of the knowledge on these topics.

Welcome to AMPS 2018!

General Co-Chairs

Prof. Carlo Muscas, *University of Cagliari - Cagliari, Italy*

Prof. Lorenzo Peretto, *University of Bologna - Bologna, Italy*

Technical Program Co-Chair

Prof. Antonello Monti, *E.ON Energy Research Center RWTH Aachen University - Aachen, Germany*

IEEE AMPS 2018 Organizers

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Carlo Muscas, *University of Cagliari, Italy*

Lorenzo Peretto, *University of Bologna, Italy*

Technical Program Chairs

Antonello Monti, *E.ON Energy Research Center RWTH Aachen University, Germany*

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Sara Sulis, *University of Cagliari, Italy*

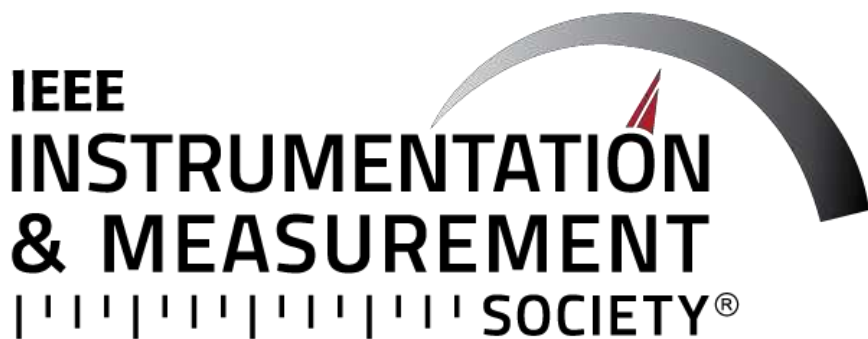
Ferdinanda Ponci, *E.ON Energy Research Center RWTH Aachen University, Germany*

Andrew Roscoe, *University of Strathclyde, Scotland*

Roberto Tinarelli, *University of Bologna, Italy*

Conference Management

Conference Catalysts, LLC, USA



Wednesday, September 26

08:30 - 09:00
Registration

09:00 - 09:20
Welcome Address

09:20 - 09:30
Poster Presentation

09:30 - 11:00
Power system harmonics I
Chair: Sara Sulis (University of Cagliari, Italy)

09:30 Assessing Distortion Within the IEC Framework in the Presence of High Frequency Components: Some Considerations on Signal Processing
Adam Collin (University of Campania - Luigi Vanvitelli, Italy)
Sasa Djokic (Institute for Energy Systems. The University of Edinburgh, United Kingdom (Great Britain))
Jiri Drapela (Brno University of Technology, Czech Republic)
Roberto Langella (University of Campania - Luigi Vanvitelli, Italy)
Alfredo Testa (University of Campania - Luigi Vanvitelli, Italy)

10:00 Harmonics Estimation in Transient Conditions using Static and Dynamic Frequency-domain Techniques
David Macii (University of Trento, Italy)
Dario Petri (University of Trento, Italy)

10:30 Impact of Aggregation Interval on Harmonic Phase Angle Measurements
Brandon Peterson (North-West University & Eskom, South Africa)
Johan Rens (North West University, South Africa)
Gerhard Botha (North-West University, South Africa)
Ana M Blanco (Technische Universität Dresden, Germany)
Jan Meyer (Technische Universität Dresden, Germany)
Jan Desmet (UGent, Belgium)

11:00 - 11:30
Coffee Break

11:30 - 13:00
Voltage and current sensors I
Chair: Sergio Toscani (Politecnico di Milano, Italy)

11:30 An Efficient Digitizer for Calibration of Instrument Transformers
Noby George (National Institute of Technology, Rourkela, India)
Prashanth Vooka (Indian Institute of Technology Tirupati, India)
Gopalakrishna Srungavarapu (National Institute of Technology, Rourkela, India)

12:00 On the Remote Calibration of Voltage Transformers: Validation of Opportunity
Johan Rens (North West University, South Africa)
Sané Rens (North West University, South Africa)
Gerhard Botha (North-West University, South Africa)
Jan Desmet (Ghent University, Belgium)

Wednesday, September 26

12:30 Compensation of Current Transformers' Non-Linearities by means of Frequency Coupling Matrices

Adam Collin (University of Campania Luigi Vanvitelli, Italy)

Antonio Delle Femine (University of Campania Luigi Vanvitelli, Italy)

Daniele Gallo (University of Campania Luigi Vanvitelli, Italy)

Roberto Langella (University of Campania Luigi Vanvitelli, Italy)

Mario Luiso (University of Campania Luigi Vanvitelli, Italy)

13:00 - 14:30

Lunch

14:30 - 16:00

Power Quality

Chair: Daniel Belega (University of Timisoara, Romania)

14:30 Definition and measurement of power quality indices in low voltage DC networks

Julio Barros (University of Cantabria, Spain)

Matilde Apraiz (University of Cantabria, Spain)

Ramón I. Diego (University of Cantabria, Spain)

15:00 PQ metrics implementation on low cost smart metering platforms. A case study analysis

Giovanni Artale (Università di Palermo, Italy)

Antonio Cataliotti (Università di Palermo, Italy)

Valentina Cosentino (Università di Palermo, Italy)

Dario Di Cara (National Research Council, Italy)

Nunzio Di Paola (STMicroelectronics, Italy)

Salvatore Guaiana (Università di Palermo, Italy)

Nicola Panzavecchia (National Research Council, Italy)

Marilena Sambataro (STMicroelectronics, Italy)

Giovanni Tinè (National Research Council, Italy)

15:30 Voltage Supply Frequency Uncertainty influence on Power Quality index: A qualitative analysis of Higher-Order Statistics 2D trajectories

Olivia Florencias-Oliveros (University of Cadiz, Spain)

Agustin Agüera-Pérez (University of Cadiz, Spain)

Jose Maria Sierra-Fernández (University of Cadiz & PAIDI-TIC-168 Reserach Group, Spain)

Juan José González de la Rosa (University of Cadiz, Spain)

Jose Carlos Palomares-Salas (University of Cadiz & Research Unit PAIDI-TIC-168, Spain)

Manuel Jesús Espinosa-Gavira, MJEG (University of Cadiz & PAIDI-TIC-168 Reserach Group, Spain)

16:00 - 16:30

Coffee Break

16:30 – 17:30

Measurements on power system components I

Chair: Alessandro M Ferrero (Politecnico di Milano, Italy)

16:30 Reactive Power and GIC: the problems of an unrecognized operationalist measurement

Harold Kirkham (Pacific Northwest National Laboratory, USA)

D. White (Measurement Standards Laboratory of New Zealand, New Zealand)

17:00 Comparison of measurement methods of grid impedance for Narrow Band-PLC up to 500 kHz

Lino Capponi (HES-SO Valais-Wallis, Switzerland)

Igor Fernandez Perez (University of the Basque Country (UPV/EHU), Spain)

Dominique Roggo (HES-SO Valais-Wallis, Switzerland)

Amaia Arrinda (University of the Basque Country, Spain)

Itziar Angulo (University of the Basque Country (UPV/EHU), Spain)

David de la Vega (University of the Basque Country (UPV/EHU), Spain)

9:30 – 17:30

Poster Session

9:30 PMU-based Technique for the Estimation of Line Parameters in Three-phase Electric Distribution Grids

Roberto Puddu (University of Cagliari, Italy)

Kyle Brady (University of California, Berkeley, USA)

Carlo Muscas (University of Cagliari, Italy)

Paolo Attilio Pegoraro (University of Cagliari, Italy)

Alexandra von Meier (University of California, Berkeley & CIEE, USA)

09:30 Accuracy verification of PLL-based acquisition system for low-cost applications

Alessandro Mingotti (University of Bologna, Italy)

Roberto Tinarelli (University of Bologna, Italy)

Lorenzo Peretto (University of Bologna, Italy)

Lorenzo Bartolomei (University of Bologna, Italy)

Paola Rinaldi (University of Bologna, Italy)

09:30 A Testbed for Static and Dynamic Characterization of DC Voltage and Current Transducers

Gabriella Crotti (Istituto Nazionale di Ricerca Metrologia, Italy)

Domenico Giordano (Istituto Nazionale di Ricerca Metrologica, Italy)

Antonio Delle Femine (University of Campania Luigi Vanvitelli, Italy)

Daniele Gallo (University of Campania Luigi Vanvitelli, Italy)

Carmine Landi (University of Campania Luigi Vanvitelli, Italy)

Mario Luiso (University of Campania Luigi Vanvitelli, Italy)

09:30 Low-Cost Monitoring Unit for MV Cable Joints diagnostics

Roberto Tinarelli (University of Bologna, Italy)

Lorenzo Peretto (University of Bologna, Italy)

Giovanni Mazzanti (University of Bologna, Italy)

Alessandro Mingotti (University of Bologna, Italy)

Abbas Ghaderi (University of Bologna, Italy)

Giovanni Valtorta (E-distribuzione, Italy)

Giuseppe Amoroso (E-distribuzione, Italy)

Stefano Danesi (E-distribuzione, Italy)

Thursday, September 27

09:00 - 11:00

Phasor Measurement Units

Chair: Carlo Muscas (University of Cagliari, Italy)

09:00 Low-latency Phasor Measurement Using Offset Time Reference and Asymmetric Dictionary

Giada Giorgi (Università di Padova, Italy)

Claudio Narduzzi (Università di Padova, Italy)

09:30 Synchrophasor-Based ROCOF Measurements: Feasibility in Real-World Scenarios

Guglielmo Frigo (École Polytechnique Fédérale de Lausanne (EPFL), Switzerland)

Asja Derviskadic (École Polytechnique Fédérale de Lausanne (EPFL), Switzerland)

Claudio Narduzzi (Università di Padova, Italy)

Mario Paolone (Swiss Federal Institute of Technology of Lausanne (EPFL), Switzerland)

10:00 Impact of Capacitor Voltage Transformers on Phasor Measurement Units' Dynamic Performance

Roberto Ferrero (University of Liverpool, United Kingdom (Great Britain))

Paolo Attilio Pegoraro (University of Cagliari, Italy)

Sergio Toscani (Politecnico di Milano, Italy)

10:30 Accuracy of the Synchrophasor Estimator Returned by the Interpolated DFT Algorithm Under Off-Nominal Frequency and Harmonic Conditions

Daniel Belega (University of Timisoara, Romania)

Dario Petri (University of Trento, Italy)

11:00 - 11:30

Coffee Break

11:30 - 13:00

Grid monitoring and fault detection

Chair: Johan Rens (North West University, South Africa)

11:30 The Path Towards Smarter Circuit Breakers

Alberto Carboni (Politecnico di Milano, Italy)

Gabriele Perrone (ABB, Italy)

Enrico Ragaini (ABB, Italy)

Alessandro M Ferrero (Politecnico di Milano, Italy)

Thursday, September 27

12:00 Impact of Measurement Accuracy on Fault Detection obtained with Compressive Sensing

Daniele Carta (University of Cagliari, Italy)

Paolo Attilio Pegoraro (University of Cagliari, Italy)

Sara Sulis (University of Cagliari, Italy)

12:30 Fault detection and prediction in Smart Grids

Christian Andre Andresen (SINTEF Energy Research, Norway)

Bendik Torsæter (SINTEF Energy Research, Norway)

Hallvar Haugdal (NTNU, Norway)

Kjetil Uhlen (Norwegian University of Science and Technology (NTNU), Norway)

13:00 - 14:30

Lunch

14:30 - 16:00

Power system harmonics II

Chair: Julio Barros (University of Cantabria, Spain)

14:30 Comparison of measurement methods for the frequency range 2 - 150 kHz (supraharmonics)

Anne Grevener (Technische Universität Dresden, Germany)

Jan Meyer (Technische Universität Dresden, Germany)

Sarah Rönneberg (Luleå University of Technology, Sweden)

15:00 Measurement uncertainty of current harmonics during the assessment of compliance to grid code requirements

Zander Marais (North-West University, South Africa)

Johan Rens (North West University, South Africa)

Brandon Peterson (North-West University & Eskom, South Africa)

Gerhard Botha (North-West University, South Africa)

15:30 Considerations on the Performance of Multi-point Synchronized Harmonic Measurement System

Stanislav Babaev (Eindhoven University of Technology, The Netherlands)

Ravi Shankar Singh (Eindhoven University of Technology, The Netherlands)

Vladimir Cuk (Eindhoven University of Technology, The Netherlands)

Joseph Cobben (Eindhoven University of Technology, The Netherlands)

Helko van den Brom (VSL, The Netherlands)

16:00 - 16:30

Coffee Break

Thursday, September 27

16:30 - 17:30

Synchronized Measurement Systems

Chair: Claudio Narduzzi (Universita' di Padova, Italy)

16:30

A Technique of Synchronization of Distributed Energy Measurement in Low Voltage Electrical Grid

Zilvinas Nakutis (Kaunas University of Technology, Lithuania)

Vitas Grimaila (Studentu str. 50 & Kaunas University of Technology, Lithuania)

Pranas Kuzas (Kaunas University of Technology, Lithuania)

Vytautas Daunoras (Kaunas University of Technology, Lithuania)

Tadas Rybelis (Kaunas University of Technology, Lithuania)

17:00

Calibration of synchronised measurement system: from the instrument transformer to the PMU

Roberto Tinarelli (University of Bologna, Italy)

Alessandro Mingotti (University of Bologna, Italy)

Lorenzo Peretto (University of Bologna, Italy)

Andrea Angioni (RWTH Aachen University, Germany)

Antonello Monti (RWTH Aachen University & Institute for Automation of Complex Power Systems, Germany)

Ferdinanda Ponci (RWTH Aachen University, Germany)

19:30 - 22:00

Social Dinner

Ristorante Cesari

Via Carbonesi n.8

40123 Bologna, Italy

Friday, September 28

09:00 - 11:00

Measurements on power system components II

Chair: Lorenzo Peretto (University of Bologna, Italy)

09:00 Pantograph-to-OHL Arc: Conducted Effects in DC Railway Supply System

Domenico Giordano (Istituto Nazionale di Ricerca Metrologica, Italy)

Daniele Gallo (University of Campania Luigi Vanvitelli, Italy)

Andrea Mariscotti (ASTM, Swaziland)

Antonio Delle Femine (University of Campania Luigi Vanvitelli, Italy)

Carmine Landi (University of Campania Luigi Vanvitelli, Italy)

Paolo E Roccato (Istituto Nazionale di Ricerca Metrologica, Italy)

Mario Luiso (University of Campania Luigi Vanvitelli, Italy)

Gabriella Crotti (Istituto Nazionale di Ricerca Metrologica, Italy)

09:30 A Direct Junction Temperature Measurement Technique for Power LEDs

Giovanni Pangallo ("Mediterranea" University Reggio Calabria, Italy)

Riccardo Carotenuto ("Mediterranea" University Reggio Calabria, Italy)

Demetrio Iero ("Mediterranea" University Reggio Calabria, Italy)

Elisa Demetra Mallemace ("Mediterranea" University Reggio Calabria, Italy)

Massimo Merenda ("Mediterranea" University Reggio Calabria, Italy)

Sandro Rao ("Mediterranea" University Reggio Calabria, Italy)

Francesco Della Corte ("Mediterranea" University Reggio Calabria, Italy)

10:00 Design and Calibration of a Test Setup for Tan Delta Measurements on MV Cable Joints

Alessandro Mingotti (University of Bologna, Italy)

Abbas Ghaderi (University of Bologna, Italy)

Lorenzo Peretto (University of Bologna, Italy)

Roberto Tinarelli (University of Bologna, Italy)

Filippo Lama (University of Bologna, Italy)

10:30 Characterization of Energy Storage Systems for Renewable Generators: An Experimental Testbed

Stefano Rinaldi (University of Brescia, Italy)

Marco Pasetti (University of Brescia, Italy)

Alessandra Flammini (University of Brescia, Italy)

Florian De Simone (ENEDIS, France)

11:00 - 11:30

Coffee Break

Friday, September 28

11:30 – 13:00

Voltage and current sensors II

Chair: Mario Luiso (University of Campania Luigi Vanvitelli, Italy)

11:30 Impact of Coreless Current Transformer Position on Current Measurement

Yukai Xiang (Fuzhou University, P.R. China)

Xu Lin (Fuzhou University, P.R. China)

Xianan Chen (Fuzhou University, P.R. China)

Kun-Long Chen (Fuzhou University, P.R. China)

12:00 A Simple Method for Compensating the Harmonic Distortion Introduced by Voltage Transformers

Marco Faifer (Politecnico di Milano, Italy)

Christian Laurano (Politecnico di Milano, Italy)

Roberto Ottoboni (Politecnico di Milano, Italy)

Sergio Toscani (Politecnico di Milano, Italy)

Michele Zanoni (Politecnico di Milano, Italy)

12:30 An Auto-Balancing Scheme for Non-Contact AC Voltage Measurement

Boby George (Indian Institute of Technology Madras, India)

Shenil PS (College of Engineering Trivandrum, India)