

## MESSAGE FROM THE CHAIRMEN

AMPS 2011, sponsored by the IEEE Instrumentation and Measurement Society, is the 2nd edition of the international workshop on Applied Measurements in Power Systems and has the main goal of highlighting measurement issues in modern electric power networks and encouraging discussion among experts coming from academia as well as from industry and electric utilities.

It is well known that measurement applications in power systems are continuously evolving, with new challenging aspects to be considered in monitoring, managing and controlling both the power grid and several of its components (generators, transformers, converters, etc.).

In this evolution, the development of more performing measurement systems and devices is associated to the need of defining new procedures to ensure the quality of the data.

As an example, the need for a new generation of voltage and current transducers comes along with the necessity to provide on-site verifications of the transducers installed in the power systems.

From the same point of view, despite the fact that Phasor Measurement Units (PMUs) are worldwide recognized as crucial devices for the management of modern power networks and the development of Smart Grids, several critical issues are still open about the meaning of the synchrophasors measured by these devices in some conditions and consequently their practical use in wide area monitoring systems.

Again, by considering the impact of ICT infrastructures in modern measurement systems for power grids, a measurement perspective is required to deal with critical aspects, such as synchronization, communication media, etc., so that the accuracy of the results provided by these complex measurement systems is guaranteed.

The papers collected in these Proceedings cover the above topics and many others, like power quality and diagnostics of components, by merging the methodological aspects with the concerns arising from practical applications.

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 2011!

### **General Co-Chairs**

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

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

### **Technical Program Chair**

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

# **AMPS 2011 Organizing Committee**

## **General Chairs**

Lorenzo Peretto, *University of Bologna, Italy*  
Carlo Muscas, *University of Cagliari, Italy*

## **Technical Program Chair**

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

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Alessandro Ferrero, *Polytechnic of Milano, Italy*  
Mihaela Albu, *Politehnica University of Bucharest, Romania*  
Julio Barros, *University of Cantabria, Spain*  
Ferdinanda Ponci, *E.ON Energy Research Center RWTH Aachen University, Germany*  
Roberto Tinarelli, *University of Bologna, Italy*

## **Conference Management**

*Conference Catalysts, LLC, USA*

## Wednesday, September 28

**8:30 AM - 9:00 AM**                      **Registration**

**9:00 AM - 10:15 AM**

### **Opening Session**

Welcome Address

**9:15 AM - 10:15 AM**                      **Keynote Speech**

Speaker: *Martin Kahmann*

### **Contributions of the German National Metrology Institute PTB to the development of Smart Electrical Grids in Germany**

**10:15 AM - 10:45 AM**                      **Coffee Break**

**10:45 AM - 12:30 PM**

### **Models and instruments for measurements of nonsinusoidal quantities**

Session Chair: *Carlo Muscas, University of Cagliari, Italy*

### **Unbalance Analysis for Electrical Power Systems in the Presence of Harmonics and Interharmonics**

*R. Langella, Second University of Naples, Italy*

*A. Testa, Second University of Naples, Italy*

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

### **A metrological comparison between different methods for harmonic pollution metering**

*Alessandro M. Ferrero, Politecnico di Milano, Italy*

*Marco Prioli, Politecnico di Milano, Italy*

*Simona Salicone, Politecnico di Milano, Italy*

### **Applications of wavelet transforms in electric power quality: harmonic distortion**

*Julio Barros, University of Cantabria, Spain*

*Ramón I. Diego, University of Cantabria, Spain*

*Matilde Apráiz, University of Cantabria, Spain*

**12:30 PM - 2:30 PM**                      **Lunch**

**2:30 PM - 4:00 PM**

### **Synchrophasors**

Session Chair: *Julio Barros, University of Cantabria, Spain*

### **Accuracy of DFT-based Synchrophasor Estimators at Off-nominal Frequencies**

*David Macii, University of Trento, Italy*

*Dario Petri, University of Trento, Italy*

*Alessandro Zorat, University of Trento, Italy*

### **Performance comparison of algorithms for synchrophasors measurements under dynamic conditions**

*Paolo Castello, University of Cagliari, Italy*

*Carlo Muscas, University of Cagliari, Italy*

*Paolo Attilio Pegoraro, University of Cagliari, Italy*

## **Transient Behavior of the Full-Cycle DFT Phasor Estimator**

Dario Petri, *University of Trento, Italy*

Daniel Belega, *University of Timisoara, Romania*

**4:00 PM - 4:30 PM**

**Coffee Break**

**4:30 PM - 6:30 PM**

## **Voltage and current transducers I**

Session Chair: *Lorenzo Peretto, University of Bologna, Italy*

## **Development and Use of a Medium Voltage**

Gabriella Crotti, *Istituto Nazionale di Ricerca Metrologia, Italy*

Domenico Giordano, *Istituto Nazionale di Ricerca Metrologica, Italy*

Angelo Sardi, *Istituto Nazionale di Ricerca Metrologica, Italy*

## **System for High Voltage Current Transformers Onsite Verification**

M. M. Costa, *Eletrobras Eletronorte, Brazil*

J. C. D. Carvalho, *Eletrobras Eletronorte, Brazil*

D. B. Dahlke, *LACTEC, Brazil*

P. H. M. Santos, *COPEL, Brazil*

## Thursday, September 29

9:00 AM - 10:30 AM

### Voltage and current transducers II

Session Chair: *Alessandro M Ferrero, Politecnico di Milano, Italy*

#### Instrument Transformers: a Different Approach to Their Modeling

*Francesco Della Torre, Politecnico di Milano, Italy*

*Marco Faifer, Politecnico di Milano, Italy*

*Adriano Morando, Politecnico di Milano, Italy*

*Roberto Ottoboni, Politecnico di Milano, Italy*

*Claudio Cherbaucich, RSE S.p.A., Italy*

*Mario Gentili, RSE S.p.A., Italy*

*Paolo Mazza, RSE S.p.A., Italy*

#### A Self-Shielded Current Transducer For Power System Application

*Maria Gabriella Masi, University of Bologna, Italy*

*Lorenzo Peretto, University of Bologna, Italy*

*Roberto Tinarelli, University of Bologna, Italy*

#### An AC/DC sensing method based on adaptive magnetic modulation technology with double feedback properties

*Min Yingzong, Corporate Technology, Siemens China Ltd, China*

*Du Feng, Corporate Technology, Siemens China Ltd, China*

*Chen Weigang, Corporate Technology, Siemens China Ltd, China*

*Zhuo Yue, Corporate Technology, Siemens China Ltd, China*

*Michael Anheuser, Siemens AG, Germany*

10:30 AM - 11:00 AM

Coffee Break

11:00 AM - 12:30 PM

### State Estimation and WAMS

Session Chair: *Alfredo Testa, Second University of Naples, Italy*

#### Development of a flexible laboratory testing platform for assessing steady-state and transient performance of WAMS

*Alexandru Nechifor, University of Manchester, United Kingdom*

*Pawel Regulski, University of Manchester, United Kingdom*

*Deyu Cai, University of Manchester, United Kingdom*

*Vladimir Terzija, University of Manchester, United Kingdom*

#### Analysis of Distribution Grids: State Estimation using Model Uncertainties

*Mihaela Albu, Politehnica University of Bucharest, Romania*

*Elias Kyriakides, University of Cyprus, Cyprus*

*Ana Maria Dumitrescu, Politehnica University of Bucharest, Romania*

*Irina Florea, Politehnica University of Bucharest, Romania*

#### Impact of PMU Synchronization on Wide Area State Estimation

*Junjie Tang, RWTH Aachen University, Germany*

*Marco Lixia, University of Cagliari, Italy*

*Junqi Liu, RWTH Aachen University, Germany*

*Carlo Muscas, University of Cagliari, Italy*

*Antonello Monti, RWTH Aachen University, Germany*

**12:30 PM - 2:30 PM**                      **Lunch**

**2:30 PM - 4:00 PM**

**Panel Session: Open issues in power system measurements**

Session Chairs: *Mihaela Albu, Politehnica University of Bucharest, Romania & Lorenzo Peretto, University of Bologna, Italy*

**4:00 PM - 4:30 PM**                      **Coffee Break**

**4:30 PM - 5:30 PM**

**Open issues in power system measurements**

Session Chairs: *Mihaela Albu, Politehnica University of Bucharest, Romania & Lorenzo Peretto, University of Bologna, Italy*

**8:00 PM - 10:00 PM**                      **Social Dinner**

## Friday, September 30

9:00 AM - 11:00 AM

### Measurements on electric power plants and machines

Session Chair: *Antonello Monti, RWTH Aachen University, Germany*

#### A Measurement System for the On-Line Diagnostics of Power Transformer Bushings

Marco Faifer, *Politecnico di Milano, Italy*

Roberto Ottoboni, *Politecnico di Milano, Italy*

Sergio Toscani, *Politecnico di Milano, Italy*

#### The Measurement Layer of the Virtual Synchronous Generator Operation in the Field Test

Mihaela Albu, *Politehnica University of Bucharest, Romania*

Mihai Calin, *Politehnica University of Bucharest, Romania*

Dumitru Federenciuc, *Electrica S.A., Romania*

Javier Diaz, *UFE GmbH, Germany*

#### Monitoring of a PV system: the role of the panel model

Loredana Cristaldi, *Politecnico di Milano, Italy*

Marco Faifer, *Politecnico di Milano, Italy*

Marco Rossi, *Politecnico di Milano, Italy*

Ferdinanda Ponci, *RWTH Aachen University, Germany*

#### Control Method for Grid-Connected Converters in Systems with Non-Ideal Supply Voltage

Herbert Ginn, III, *University of South Carolina, USA*

11:00 AM - 11:30 AM            **Coffee Break**

11:30 AM - 1:00 PM

#### ICT issues in power system measurements

Session Chair: *Ferdinanda Ponci, RWTH Aachen University, Germany*

#### ICT Architecture for an Integrated Distribution Network Monitoring

D. Della Giustina, *A2A Reti Elettriche SpA, Italy*

S. Repo, *Tampere University of Technology, Finland*

S. Zanini, *A2A Reti Elettriche SpA, Italy*

L. Cremaschini, *A2A Reti Elettriche SpA, Italy*

#### Simulation of a Power Line Communication System in Medium and Low Voltage Distribution Networks

Antonio Cataliotti, *University of Palermo, Italy*

Valentina Cosentino, *Università di Palermo, Italy*

Dario Di Cara, *Università di Palermo, Italy*

Giovanni Tinè, *National Research Council, Italy*

#### Time Synchronization Concerns in Substation Automation System

Paolo Ferrari, *University of Brescia, Italy*

Alessandra Flammini, *University of Brescia, Italy*

Stefano Rinaldi, *University of Brescia, Italy*

Gunnar Prytz, *ABB Corporate Research, Norway*

1:00 PM - 1:30 PM            **Closing Session**