



The Institute of Electrical and Electronics Engineers (IEEE)

Galveston Bay Section
Joint Societies (IMS) Chapter



ONLINE Virtual Meeting ---July 17th, 2020 11:30 AM-12:30 PM

TOPIC: "Measurement issues in emerging power grids"

SPEAKER: Prof. Mihaela Albu, Distinguished Speaker IEEE/IMS



Politehnica University of Bucharest, Romania

PRESENTATION:

Modern control algorithms in the emerging power systems process information delivered mainly by distributed, synchronized measurement systems, and available in data streams with different reporting rates. Beyond existing measurement approaches currently embedded in SCADA framework, smart meters and high-resolution waveform-based monitoring devices like phasor measurement units (PMUs) which can include fault-recorder functionality, a new paradigm is on the way to be largely deployed, based on synchronized measurement information conveyed by point-on-wave and sampled-values delivered by new instrument transformers. However it is expected that on short time horizon the two approaches will co-exist and this requires special attention to be paid to the different information compression rate offered by each measurement chain: for example, the lossless compression in case of sampled-data standard has to be correlated with the lossy information model used by the phasor measurement systems.

In addition, there are several applications where synchronized data received with high reporting rate has to be used together with aggregated data from measurement equipment having a lower reporting rate (complying with power quality data aggregation standards) and the accompanying question is how adequate the energy transfer models in such variety of cases are. For example, the emerging active distribution grids operation is impacted by high variability of the energy transfer and consequently a new model approximation for its characteristic quantities (voltages, currents) is needed. Such a model is required not only in order to be able to correctly design future measurement systems but also for better assessing the quality of existing "classical" measurements, still in use for power quality improvement, voltage control, frequency control, network parameter estimation etc. Currently there is a debate ongoing referring to the most appropriate definition of frequency and its rate of change for dynamic and quasi-steady states in existing power systems. The state-of-art in power quality measurements and associated signal processing is applied in emerging control algorithms dedicated to microgrids (including DC and hybrid) and energy communities, new systems with low inertia and therefore unprecedented operational constraints. Some of those constraints are linked to measurement processes with operational features and therefore they might fail to meet the needs of the user, unless a careful analysis of the model uncertainties is performed.

The talk will address: = 1) The measurement paradigm in power systems; 2) Voltage and frequency variability; [a-Definitions of phase, frequency and rate of change of frequency in electric power systems; Phasor Measurement Units, b-Model uncertainty and measurement sources of errors; c Information compression, lossy algorithms used in existing measurement systems, d- Measurement data aggregation; filtering properties, 3) Applications and challenges- [a-Smart metering with high reporting rate (1s) for load modeling in energy communities, b-Linear and hybrid state estimators; WAMCS]

This presentation provides an overview of these techniques, with examples from worldwide measurement solutions enabling modern control deployment.

Mihaela Albu is a professor of electrical engineering, graduated (1987) from Power Engineering Department of UPB and holds the Ph.D. degree (1998) from the same university. She is teaching courses on electrical measurements, signal processing and Smart Grids topics at both graduate and undergraduate programmes of UPB. Her research interests encompass synchronized measurements for wide area measurement and control systems; smart metering; DC and hybrid microgrids; power quality, IEEE and IEC standards in power (including contribution to the IEC TC8/JWG12: System aspects of electrical energy supply-Requirements for frequency measurement used to control DER and loads). Dr Albu was spending a leave at Arizona State University as a Fulbright Fellow 2002 – 2003 and in 2010. She has been P.I. of more than 40 research projects, funded by national and international research agencies, on measurements in smart grids topics. Dr. Albu is a Senior Member of the IEEE and member of the IEEE IMS TC39, Instrumentation for the Power Systems. Mihaela Albu presented several tutorials at I2MTC (2010-2019) and has been invited as IMS DL (2017-2020) at events in R8 and R10.

Organized by the GBS/Joint Societies Chapter, the presentation is open to all Interested IEEE and non-IEEE members. Registration is needed by WEDNESDAY July 15th to attend. Log-in Information will be provided to all registrants. Send your registration request to Dr Zafar Taqvi at Z.Taqvi@IEEE.Org by COB July 15th.

Reservations to attend this meeting should be made by email to: Z.Taqvi@ieee.org

©2006 IEEE Inc. Galveston Bay Section. Copying permitted, altering forbidden. All other rights reserved.

Please check IEEE GBS website: <https://site.ieee.org/gb/> for map and more.