

ABSTRACT

Emerging power systems are requiring changes on all layers - planning, operation, markets. Smart grids operation, including control of the energy flow in active distribution grids adds more challenges to the measurement layer. Presently there is a gap between (i) the level of approximation used for modeling the current and voltage waveforms which is implicitly assumed by most of the measurement devices deployed in power systems and (ii) the capabilities and functionalities exhibited by the high fidelity, high accuracy and high number of potential reporting rates of the newly deployed synchronized measurement units (SMU). This gap can determine a significant depreciation of the information mediated by the control systems that are relying on real-time measurements delivered by equipment. The need of synchronized data received with high reporting rate used in the same unique application together with aggregated data from measurement equipment with a lower reporting rate (complying with power quality data aggregation standards) is raising the question of achieving compatible data for ultimately assessing relevant information on the energy transfer in distribution grids.

The tutorial will address:

- the measurement paradigm in emerging power systems and models for the energy transfer;
- spatial aggregation: clustering; smart metering;
- time aggregation: information concentrators; data reporting; the Power Quality standardization framework;
- dual aggregation – in space and in time: synchronized measurements; PDC philosophy; communication delays; standards.
- related issues (the randomness power)