Oscillation Monitoring and Control of the RTE Power System Using Synchrophasors

by

Mohammadreza Maddipour Farrokhifard, PhD Candidate
Mani Venkatasubramanian, ESIC Director/Professor
Energy Systems Innovation Center, Washington State University

Tuesday, February 11 • 11:00 AM – Noon • ETRL 101

OVERVIEW

This talk addresses methods for monitoring and mitigating problematic oscillations in electric power grids by using wide-area synchronized measurements. We will focus on a recent WSU project in which we studied oscillation phenomena in the French (RTE) portion of the European power. Oscillation monitoring algorithms developed at WSU will be illustrated for the analysis of two recent major oscillation events in the RTE power system. Data from Phasor Measurement Units (PMUs) collected during the events are analyzed by using ambient and ringdown model estimation tools. Fast Frequency Domain Decomposition (FFDD) and Covariance-based Fast Stochastic Subspace Identification (FSSI-Cov) are applied for ambient model analysis.

Analysis of these two events shows the relative strengths and weaknesses of different oscillation monitoring algorithms and their usefulness in measurement-based modal analysis of large system events. In the second part, the problem of clustering of estimates from an ambient oscillation monitoring algorithm into groupings of different system mode estimates will be discussed. Mitigating the mechanism of each mode or forced oscillation requires a specific remedial action and the mode estimates should be properly clustered and identified before such corrective actions can be determined. Oscillation monitoring and clustering algorithms will be illustrated on actual PMU data and estimates from the RTE power system.

BIO

Mohammadreza Maddipour Farrokhifard is a Ph.D. Candidate in the school of Electrical Engineering and Computer Science at WSU. He received his MS degree in electrical engineering from Sharif University of Technology (2013). His research interests include power systems dynamics, PMU-based applications, and renewable energies. Maddipour is a member of IEEE and serves as a reviewer for numerous journals such as IEEE Transactions on Power Systems. He was awarded Outstanding Contributor in Reviewing by International Journal of Electrical Power and Energy Systems and was a recipient of the best project poster award of a PSERC IAB meeting. Maddipour also serves as the industry projects manager of Synchrophasor Analytics and Intelligence Laboratory (SAIL) at WSU.