



System Identification Tools for Power Systems Using Synchronized Measurements

Final Project Report

S-97G

Power Systems Engineering Research Center
*Empowering Minds to Engineer
the Future Electric Energy System*



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Executive Summary

With large-scale integrations of renewable energy sources, the dynamics of the power systems are becoming more complex in power grids all over the world. Fast dynamic controls and switches that are built into the newer power electronic based energy interfaces are interacting with the traditional power grid controls in unpredictable ways. These complex and non-smooth dynamic mechanisms are impacting on the small-signal and transient stability properties of bulk power systems. This project focused on the development of novel system identification tools that will use synchronized measurements to derive insight on the input-output properties of power system components. For improving adaptive control designs, efficient probing signals have been designed for online estimation of transfer functions. An open-source model identification toolbox has been developed for verifying and validating the dynamic performance of power system components using available synchrophasor measurements.