



Oscillation Analysis with SCADA using Inferential Statistics (OASIS)

Final Project Report

S-103G

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



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Executive Summary

Interarea and forced oscillations are emerging as operational concerns in modern power systems because of the changing intermittent generation patterns, unusual transmission power flows, and the integration of inverter-based resources with traditional power grid equipment. The project's objective is to develop rigorous statistical methods that can use widely available SCADA measurements to detect and analyze power system oscillations. Even though millions of SCADA measurements are available in a typical power utility company, they are used chiefly for quasi-steady-state analysis in the present-day power system owing to their slow sampling rate. In this project, we propose using SCADA to detect the source of problematic dynamic oscillations in the power grid. This is accomplished by exploiting the asynchronous sampling inherent in SCADA technology. While the oscillation period cannot be determined from SCADA data as implied by the sampling theorem, the inferential statistical formulation enables estimating the oscillation amplitude from the generation outputs and transmission line flows at a specified confidence level. The proposed methodology has been tested using the archived SCADA data from RTE France and has successfully identified the source of oscillations in those events.