

Developments in selective modal analysis of small-signal stability in electric power systems

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Abstract-

The paper presents recent developments in the Selective Modal Analysis (SMA) framework for studying selected modes of the large models that arise in the analysis of small-signal stability in power systems. The reduction procedure underlying SMA is described, and numerical results that illustrate the rapid convergence to the oscillatory modes of interest are presented. A 10-machine, 39-bus model with 93 state variables is used for the illustrative numerical studies in the paper, but experience with several models is summarized. Recently obtained extensions that allow SMA algorithms to run more efficiently are described. The application of the ideas and tools of SMA to the siting, design and tuning of power system stabilizers is also examined.

Index Terms- Control applications; dynamic stability; eigenvalues; model reduction; power system control; sensitivity analysis; singular perturbations; stabilizers; stability

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