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MECHANICAL ENGINEERING COLLOQUIUM SERIES 2015-2016

Mechanical Engineering Lecture in Dynamics

Computational Toolbox for Fast Power System Stability Assessment

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On Friday, October 2nd at 4:00pm in 3-370

Power blackouts are some of the most catastrophic disasters in modern society. To prevent the cascade of failures, power system operators perform regular risk assessment and update their contingency plans every 15 minutes, as the operating point changes. Stability assessment is by far the most computationally intensive part of this procedure that currently forces the operators to rely on engineering judgement and heuristic approaches. The challenge will only intensify when more and more uncertain distributed and renewable energy sources are introduced to the system. In this talk I will present an overview of novel computational techniques developed to alleviate the computational burden of stability assessment and design of remedial actions. After brief overview of static contingency screening and robust small-signal stability assessment approaches I will focus on the Lyapunov Function Family approach. This approach based on Semidefinite programming allows for completely simulation free assessment of transient stability and fast identification of dangerous contingencies. Moreover, it can naturally incorporate uncertainty in system operating conditions. The talk will finish with the discussion of new opportunities for fast corrective emergency control that leverage “smart” synchrophasor measurement and high voltage power electronics technologies.

Refreshments will be served before the seminar.
Please contact Tony Pulsone at pulsone@mit.edu with any questions.

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