Power Systems Engineering Research Center

A New Method for Estimating Maximum Power Transfer and Voltage Stability Margins to Mitigate the Risk of Voltage Collapse

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PSERC Public Webinar
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Description

In this webinar we introduce an idea for a new tool for voltage stability assessment using semidefinite programming. The tool will be useful for preparing strategies to mitigate the risk of voltage collapse. Employing a convex relaxation of the power flow equations, we are able to quickly determine voltage stability margins in terms of the traditional maximum power transfer capability metric. With this knowledge, operators would know how voltage stability limited the system is in being able to make power transfers. Operational decisions that increase the voltage stability margin would result in higher power transfer capability.

The method is valuable for analyzing contingency scenarios to assure grid resiliency. Importantly, the method can identify contingencies for which the system would experience voltage collapse. In those cases, the method leads to a loss of solution, and provides a negative power margin. We present an overview of the theory supporting the new method, outline the algorithm that would be used to develop a tool based on the method, and demonstrate its effectiveness on power systems of various sizes.

Biography

Bernie is a Professor of Electrical Engineering at the University of Wisconsin-Madison. He received his B.S., M.S., and Ph.D. degrees from the University of Illinois at Urbana-Champaign. His research interests involves the modeling, monitoring, and analysis of electric power systems.

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