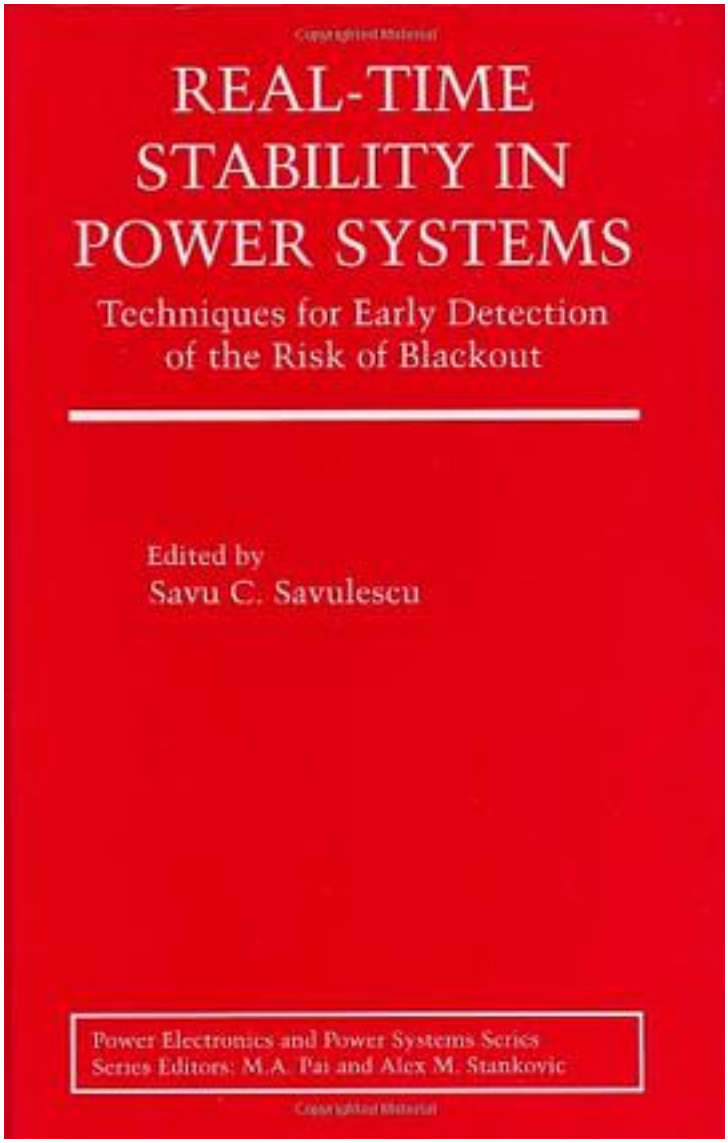
Real-Time Stability in Power Systems



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In the aftermath of the wave of blackouts that affected US, UK and mainland Europe utilities in 2003 and 2004, renewed attention has been focused on maintaining the highest level of reliability and security in the operation of power systems. The lack of adequate transmission infrastructure as well as real-time tools aimed at detecting and alarming system conditions have also been highlighted. In this context, the need to assess stability and predict the risk of blackout in real-time has become particularly relevant. Early work in this field documented in technical papers published throughout the 1990s and early 2000s underlined the importance of performing stability assessment in real-time. While static security assessment is conceptually straightforward, innovative approaches are needed to combine it with dynamic security assessment to develop an overall scheme so that results can be used for on-line decision-making. On October 13, 2004, the IEEE Power Systems Conference and Exposition 2004 hosted the 'Real-Time Stability Challenge' panel session. Organized by the Power System Dynamic Performance Committee, the panel was a forum for presenting progress achieved in this field, discussing new ideas, and identifying the challenges to be met in the course of future research. Real-Time Stability in Power Systems: Techniques for Early Detection of the Risk of Blackout is built around most of the panel papers, updated and expanded by the authors with the new material relevant to the panel theme. The chapters are contributed by well known experts in the field, thus providing an authoritative reference on the theory and implementation of real-time stability assessment -- one of the critical topics of the day. Some of the issues discussed in the book include, but are not limited to: *Stability limits and how to objectively define them, *Techniques for defining and measuring the distance to instability, *The characterization of the risk of blackout, *Discussion of quick, approximate methods to filter out non-critical contingencies and do a detailed simulation only of those that result in limit violations, *Theoretical description and practical experience with real-time and/or near real-time stability applications available today in the SCADA/EMS industry.

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