Energy and Power Group

Weekly Seminar Series

Friday, March 6, 9:10 a.m. – 10:10 a.m., ETB 1020

Dynamic Distribution Factors

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Abstract

Gradual displacement of turbine-based generators with inverter-interfaced sources reduces total rotational inertia in the power system, leading to larger transients following a disturbance, such as the sudden loss of solar photovoltaic generation. This calls for the development of dynamic contingency analysis tools to predict whether or not the system will meet operational reliability requirements in case of outage in any one particular asset, a condition known as N-1 security. In this talk, we derive closed-form expressions for time-domain functions that uncover the mapping from a generation-load imbalance to (i) system frequency, (ii) synchronous-generator outputs, and (iii) transmission-line flows. These variables must remain within acceptable ranges to satisfy the N-1 security criterion. We demonstrate the accuracy of the closed-form solutions via simulations of standard IEEE test systems.

Biography

Christine Chen is an Assistant Professor with the Department of Electrical and Computer Engineering, The University of British Columbia. Her research interests include power system analysis, monitoring, and control. She received the B.A.Sc. degree in engineering science from the University of Toronto in 2009, and the M.S. and Ph.D. degrees in electrical engineering from the University of Illinois at Urbana-Champaign in 2011 and 2014, respectively. She received the 2017-2018 Best Paper Award from the IEEE Transactions on Energy Conversion. She serves as an Editor for the IEEE Transactions on Power Systems and the IEEE Transactions on Energy Conversion.