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Next Generation Network [NGN] Webinars

Power System Stability - Challenges and Analyses

Power System Stability with High Renewable Penetration

ERCOT serves as the independent system operator (ISO) for approximately 90% of the electric load in Texas. The Texas Interconnection only connects to the neighboring grids through 1.2 GW of HVDC ties. Therefore, ERCOT is solely responsible for maintaining reliability at the interconnection level. As the penetration of inverter-based generation grew in the ERCOT system, the ISO has been proactive and introduced a number of innovative and dynamic measures to maintain frequency and voltage stability of the interconnection, such as inertia and grid strength monitoring as well as an introduction of several stability constraints. ERCOT has also carried out more detailed electromagnetic transient studies in PSCAD for weak portions of the grid, and introduced a number of improvements to increase model validation and verification process to increase accuracy of the dynamic models that are being used. This panel presentation will discuss these measures, when and why they were introduced, and related initiatives underway at ERCOT.

Speaker | Julia Matevosyan

Julia Matevosyan is Lead Planning Engineer at the Electric Reliability Council of Texas (ERCOT), Resource Adequacy Group, primarily working on adequacy of system inertial response, system flexibility, frequency control and performance issues related to high penetration levels of inverter-based generation. Her other interests are integration of storage and distributed generation. Julia is a member of CIGRE Working Group C2/C4.41 "Impact of High Penetration of Inverter-based Generation on System Inertia of Networks" and serves on a number of the technical advisory committees for projects related to high penetration of inverter-based generation carried out by NREL, EPRI, NERC and others. Julia received her BSc from Riga Technical University in Latvia, and her MSc and PhD from the Royal Institute of Technology (KTH) in Sweden.

Links & Information

Thursday, September 2, 2021
12 PM U.S. EDT | 9 AM U.S. PDT
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Duration: 1 hour

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Julia Matevosyan

Lead Planning Engineer at the Electric Reliability Council of Texas (ERCOT)

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Power System Stability - Challenges and Analyses

Automated Impedance Measurement Toolbox for Power System Stability Analysis

Power system stability study is crucial to guarantee the secure and reliable operation of the power grid with high penetration of power electronic (PE) converters. Among other stability study methods, impedance-based stability analysis is commonly used for assessing the stability of PE converter-dominated power system. The accurate impedance (matrix) measurement of PE-converters is the precondition for implementing impedance-based stability analysis, which, however, is non-trivial due to the frequency coupling nature of PE-converters introduced by its nonlinear control dynamics. This presentation will introduce a PSCAD-compatible software toolbox that we have developed for one major European transmission system operator (TSO), which enables an accurate impedance (matrix) measurement of PE converters. The presentation will start with a fundamental basis of impedance-based stability criterion, followed by an introduction of the impedance measurement toolbox. Finally, case studies will be given to demonstrate that how the impedance measurement toolbox can be adopted to predict the stability of PE converter-dominated power system in practice.

Speaker | HengWu

Heng Wu received B.S. and M.S. degrees in electrical engineering from the Nanjing University of Aeronautics and Astronautics (NUAA), Nanjing, China, in 2012 and 2015, respectively, and the Ph.D. degree in electrical engineering from Aalborg University, Aalborg, Denmark, in 2020. He is currently a postdoctoral researcher with the Department of Energy Technology, Aalborg University. He has worked with NR Electric Co., Ltd in Nanjing, China, Ørsted Wind Power in Denmark, and with Bundeswehr University Munich in Germany. He is the co-chair of IEEE Taskforce on Frequency-domain Modeling and Dynamic Analysis of HVDC and FACTS, a member of CIGRE working group B4.85, and a Steering Committee Member of CIGRE NGN Denmark. He was identified in the world's top 2% scientists by Stanford University, and received the 2019 Outstanding Reviewer Award by the IEEE Transactions on Power Electronics.

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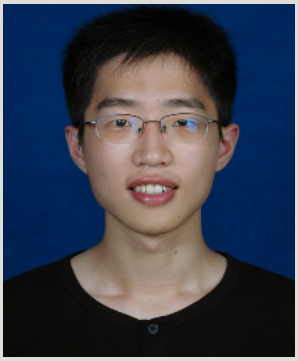

Heng Wu

Postdoctoral Researcher, Aalborg University