Time & Location: November 2, 2017 at 3:30 PM in HEC 356
Title: Online Neuro-Adaptive Learning for Power System Dynamic State Estimation

With the increased penetration of renewable generation in the smart grid, it is crucial to have knowledge of rapid changes of system states. The information of real-time electro-mechanical dynamic states of generators are essential to ensuring reliability and detecting instability of the grid. The conventional SCADA based Dynamic State Estimation (DSE) was limited by the slow sampling rates (2-4 Hz). With the advent of PMU based synchro-phasor technology in tandem with Wide Area Monitoring System (WAMS), it has become possible to avail rapid real-time measurements at the network nodes. These measurements can be exploited for better estimates of system dynamic states.

In this research, we have proposed a novel Artificial Intelligence (AI) based real-time neuro-adaptive algorithm for rotor angle and speed estimation of synchronous generators. Generator swing equations and power flow models are incorporated in the online learning. The algorithm learns and adapts in real-time to achieve accurate estimates. Simulation is carried out on 68 bus 16 generator NETS-NYPS model. The neuro-adaptive algorithm is compared with classical Kalman Filter based DSE. Applicability and accuracy of the proposed method is demonstrated under the influence of noise and faulty conditions.

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Approved for distribution by Qun Zhou, Committee Chair, on October 10, 2017.

The public is welcome to attend.