Identification of Synchronous Generator Model With Frequency Control Using Unscented Kalman Filter

Researchers at the University of South Florida have found a novel method of estimating a synchronous generator model with Frequency control using Phasor measurement unit (PMU) data and an Unscented Kalman Filter (UKF).

Previously disclosed models have focused on the generator’s electromechanical, electromagnetic and excitation systems and none have addressed frequency control system identification.

This estimation demonstrates not only electromechanical-dynamic related states and parameters but also turbine-governor dynamics and primary and secondary frequency control parameters.

PMUs are used over Supervisory Control and Data Acquisition (SCADA) systems for synchronous generator parameter estimation because of their high density sampling rate and their ability to capture system electromechanical dynamics. The use of PMU data for frequency control estimation is novel and not seen in the literature.

Our inventors have done several case studies to demonstrate the effectiveness of the proposed estimation model. The case studies demonstrated the feasibility of the proposed UKF estimation approach for system identification using PMU data. The case study on the real-world PMU data demonstrated the capability of the proposed UKF on identifying an equivalent generator model.

**ADVANTAGES:**
- Highly effective estimation related to Frequency Control
- High degree of accuracy compared to real world PMU data

**Phasor Measurement Unit data-Based Estimation Using Unscented Kalman Filter**

**Synchronous generator model including primary and secondary frequency controls**

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