

## Power System Real-Time Monitoring by Using PMU-Based Robust State Estimation Method - DTU Orbit (08/11/2017)

### Power System Real-Time Monitoring by Using PMU-Based Robust State Estimation Method

Accurate real-time states provided by the state estimator are critical for power system reliable operation and control. This paper proposes a novel phasor measurement unit (PMU)-based robust state estimation method (PRSEM) to real-time monitor a power system under different operation conditions. To be specific, an adaptive weight assignment function to dynamically adjust the measurement weight based on the distance of big unwanted disturbances from the PMU measurements is proposed to increase algorithm robustness. Furthermore, a statistical test-based interpolation matrix H updating judgment strategy is proposed. The processed and resynced PMU information are used as priori information and incorporated to the modified weighted least square estimation to address the measurements imperfect synchronization between supervisory control and data acquisition and PMU measurements. Finally, the innovation analysis-based bad data (BD) detection method, which can handle the smearing effect and critical measurement errors, is presented. We evaluate PRSEM by using IEEE benchmark test systems and a realistic utility system. The numerical results indicate that, in short computation time, PRSEM can effectively track the system real-time states with good robustness and can address several kinds of BD.

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