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Application of the Unscented Kalman Filter to experimental estimation of states and parameters of synchronous generators

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Abstract: This paper presents an experimental study of the Unscented Kalman Filter (UKF) and Extended Kalman Filter (EKF) for estimation of states and parameters of synchronous generators. The research aims at testing the suitability of the filter in an experimental environment where process noise, measurement noise and harmonics are present in the voltage and current signals. Estimates of states and parameters are obtained from the noisy measurements of input voltages, output currents and rotor angle. While the EKF is currently the leading nonlinear filtering technique in industrial applications, the results show that the estimates provided by the UKF are better in the sense that the parameter estimates feature tighter convergence to the actual values, i.e., those obtained by means of bench measurements.

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