Abstract

This paper presented the application of Kalman Filtering technique in estimating the dynamic variables for the multi-machine power systems. The Extended Kalman Filter (EKF) and Unscented Kalman Filter (UKF) are both appropriate tools to be applied in power system dynamic state estimation studies. EKF and UKF are implemented using a second-order swing equation and a classical generator model to estimate the dynamic state (generator rotor angle and generator rotor speed) and comparing the result which obtained from the two estimation algorithm (EKF and UKF) with the result from the fourth order Runge-Kutta method in order to show the statistical performance and estimation accuracy of each algorithm. The algorithms are mathematically demonstrated using the “IEEE 14-bus test system. The results show that the UKF method gives an accurate performance in the dynamic state estimation for multi-machine power system than the EKF method. It gives minimum mismatch between estimated state and actual state.

Index Terms

Computer Science  Power Systems
Keywords

Dynamic State Estimation (DSE), Kalman Filter (KF), Extended Kalman Filter (EKF), Unscented Kalman Filter (UKF)