Classification-based fast transient stability assessment of power systems using LS-SVM with enhanced feature reduction techniques

ABSTRACT

This paper presents fast transient stability assessment of a large 87-bus Malaysia test system using a new method called the least squares support vector machine (LS-SVM) with incorporation of feature reduction techniques. The investigated power system is divided into smaller areas depending on the coherency of the areas when subjected to disturbances. By doing this, the amount of data sets collected for the respective areas is reduced. Transient stability of the power system is first determined based on the generator relative rotor angles obtained from time domain simulations carried out by considering three phase faults at different loading conditions. The data collected are then used as inputs to the LS-SVM. The developed LS-SVM is used as a classifier to determine whether the power system is stable or unstable. The performance of the LS-SVM is enhanced by employing feature reduction techniques to reduce the number of features. It can be concluded that the LS-SVM with the incorporation of feature reduction techniques reduces the time taken to train the LS-SVM and improved the accuracy of the classification results.

Keyword: Transient stability assessment; Least squares support vector machine; Correlation analysis; Principle component analysis