Small Break Loss of Coolant Accident (SB-LOCA) fault diagnosis using Adaptive Neuro-Fuzzy Inference System (ANFIS)

Abstract

The detection of incipient faults of the current fault diagnosis systems in Nuclear Power Plants is inherently limited. Active research in machine learning algorithms like Adaptive Neuro-Fuzzy Inference System (ANFIS) is providing promising results in the prediction of faults. This paper explored four different configurations of Adaptive Neuro-Fuzzy Inference System (ANFIS) methodology in a bid to come up with a superior model that not only had a high sensitivity in the detection of incipient faults but also had superior prediction capabilities. The data-driven ANFIS schemes were used to predict a sensitive fault signature and to evaluate the models, Small Break Loss of Coolant Accident (SBLOCA) transient events were modeled in Qinshan I Nuclear Power Plant. Coefficient of determination, normal probability plot of residuals and mean absolute percent error were used to assess the competencies of the estimation of the models.