

Abstract

This work deals with a major problem that arises when searching for a reliable, accurate and easily exploitable adaptive threshold based fault detection technique to indicate with great accuracy the presence of a fault in a cement rotary kiln system. The adaptive threshold estimation scheme for detection of faults is developed through the mean and variance of the measured signals. Squared radii, which represent the sum of squares of these statistical parameters, are obtained. This fault detection index is calculated using several repeated experiments under the same operation conditions. At each sample time and for all the experiments, the confidential interval of instantaneous squared radii is closely related to its estimated probability density function. *Jarque-Bera* hypothesis testing is performed at a typical error risk level and confirms the obtained probability distribution law. Several significance levels are considered where the limitations of fixed thresholding and the performance of the proposed adaptive thresholding procedure are demonstrated respectively through the rate of false alarms. The proposed adaptive threshold is compared with the fixed threshold by evaluating the detection performance across various types of faults in a cement rotary kiln system