Fault Diagnosis of Molten Carbonate Fuel Cell(MCFC) Process using dynamic principal component analysis

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In a MW scale Molten Carbonate Fuel Cell power plant, a univariate alarm system that has only upper and lower limits is usually employed to identify abnormal conditions in the system. While univariate alarms are adopted for system monitoring and analysts are operating in a way to diagnose faults through alarm analysis, this simple monitoring and diagnostic system is limited for use in extended systems. PCA is used for statistical process monitoring it relies on the assumption that data are time independent. However, MCFC operating data represents a series of correlations with time. Dynamic Principal Component Analysis has been suggested as a remedy for high-dimensional and time-dependent data. The time series of PCA has been applied to confirm the normal operation of MCFC and operation at fault occurrence through DPCA. In this paper, we compared the existing PCA and the suggested DPCA method. Actual operating data was used for performance verification. Simulation results show that DPCA shows better performance.