Principle component analysis for fault isolations in a 300kW MCFC Power Plant

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A molten carbonate fuel cell(MCFC) power plant is a eco-friendly power generation process with infintesimal amount of CO_2 exhaust-gas emissions. Over the years, there is increase in research towords a modeling and simulation of process to control the unstablilty of the power generation. However, in a step closer to commercial realization, a fault isolation technique is need to achieve industry standards, for instance, the prevention of system shut-down and the fast recovery toword normal system status. Principle component analysis(PCA) can be used as a efficient fault detection by using Hotelling's T^2 statistics. Operating data and fault history supplied by POSCOPOWER from a 300kW MCFC power plant are used to validate the application of the PCA method. Data in the process consists of two mode (which are normal and abnormal operation), and the time used to post-analysis is about 1 year operation. The performance of fault isolation is compared to trip event and illustated by score, squred prediction error(SPE) and other plots. In the data preprocessing step, the experience of field engineer and process information is used to distinction between normal mode and abnormal mode.