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Fault Detection and Analysis using Statistical Data for Continuous Stirred Tank Reactor (CSTR)

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Abstract : Continuous Stirred Tank Reactor (CSTR) here is considered as a non linear process. CSTR is widely used in many industrial sectors like chemical industries, pharmaceutical, drugs manufacturing, waste water treatment plants and etc.. Due to changes in process parameters the accuracy of final product can be reduced. In order to get the product in desired concentration and temperature, faults developed in CSTR during the chemical reaction need to be analysed. If not, those faults may lead to degrade the performance of the system. For this purpose, there are various fault detection methods are to be considered. Among the methods, the Principal Component Analysis (PCA) can be proposed to detect faults in CSTR. PCA is one of the data based fault detection methods. PCA statistics like Hotelling T^2 statistic and Square Prediction Error (SPE) or Q statistics are used for detecting faults in the process. By detecting various faults, the performance of the process can be improved.

Keywords : Fault detection, Principal component analysis, T^2 and Q statistics, CSTR model.

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