

MATLAB simulation for loss of flow (LOF) in reactor TRIGA Puspatti (RTP)

ABSTRACT

TRIGA Puspatti Reactor is a nuclear reactor situated at Malaysia Nuclear Agency, Bangi. The reactor has gone to emergency shutdown when there is a fault. However, the pattern of the fault can be recognized and be diagnosed in the early stages before leading to shut down that can be helpful for repairing and future maintenance. This project modelled the plant system based on real data, and to investigate its behaviour in identifying the fault by obtaining residual. The project explores the way of modelling using system identification and a plant with a compensator model to achieve the required results. Data are obtained from the Malaysia Nuclear Agency based on the actual reactor. Two separate data sets, one set of data as validation and the other is used to form the transfer function. Once the normal condition model is done, by using the same specifications a fault model is developed with the same number of poles and zeroes. The residual is found by subtracting the output of the normal model with the fault model where it can form a pattern of fault. The fault created in the simulation by allowing the valve opening of water flow to the reactor by 25%, 50% and 75% at the cooling system of the reactor. It was found that the residual for 25% valve opening is the largest due to lower water flows from the heat exchanger lead to increase of temperature and pressure. For 50% valve opening, it is a middle-class fault and the residual created is smaller than the 25% valve opening but the value of temperature and pressure is still considerably high. So, the residual is still large but smaller than the residual for 25%. As for 75% valve opening the system output has longer oscillation. The temperature output is not that large compared to normal operation, but the system is observed to be still rising which means it has not reached a steady state yet. In this project, the residual value for these three different faults is observed and able to identify the severity of fault due to valve opening.

Keyword: Prediction model; Fault diagnosing; Residual analysis

