

Analyses for Primary Coolant Pump Coastdown Phenomena for Jordan Research and Training Reactor

Authors : Yazan M. Alatrash, Han-ok Kang, Hyun-gi Yoon, Shen Zhang, Juhyeon Yoon

Abstract : Flow coastdown phenomena are very important to secure nuclear fuel integrity during loss of off-site power accidents. In this study, primary coolant flow coastdown phenomena are investigated for the Jordan Research and Training Reactor (JRTR) using a simulation software package, Modular Modelling System (MMS). Two MMS models are built. The first one is a simple model to investigate the characteristics of the primary coolant pump only. The second one is a model for a simulation of the Primary Coolant System (PCS) loop, in which all the detailed design data of the JRTR PCS system are modelled, including the geometrical arrangement data. The same design data for a PCS pump are used for both models. Coastdown curves obtained from the two models are compared to study the PCS loop coolant inertia effect on a flow coastdown. Results showed that the loop coolant inertia effect is found to be small in the JRTR PCS loop, i.e., about one second increases in a coastdown half time required to halve the coolant flow rate. The effects of different flywheel inertia on the flow coastdown are also investigated. It is demonstrated that the coastdown half time increases with the flywheel inertia linearly. The designed coastdown half time is proved to be well above the design requirement for the fuel integrity.

Keywords : flow coastdown, loop inertia, modelling, research reactor

Conference Title : ICNTHS 2014 : International Conference on Nuclear Thermal Hydraulics and Safety

Conference Location : Madrid, Spain

Conference Dates : March 27-28, 2014