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Development of a MELCOR Model for the Koeberg pressurised water reactor

The nuclear industry and its regulators have always prioritized safety and reliability in the operation of nuclear power plants. Thus the emphasis on the development, validation, and application of reliable predictive modeling capabilities for both normal and accident conditions. The Centre for Nuclear Safety and Security (CNSS) at the National Nuclear Regulatory (NNR) provides an important function in the nuclear regulatory process in South Africa. The responsibilities of the CNSS include independent research in the safety analysis and the analyses of the consequences of design basis and severe accidents at the Koeberg Nuclear Power Station (KPNS)

The objective of the present work is to develop the MELCOR computer model for the KPNS. MELCOR is a fully integrated, engineering-level computer code that models the progression of severe accidents in light water reactor nuclear power plants. This code system is developed by Sandia National Laboratories (SNL) for the US NRC.

MELCOR as with other reactor analysis codes, e.g. TRACE, RELAP etc. relies on nodalization schemes on various packages to capture/model the geometry of the core. These packages include the Control Volume Hydrodynamics (CVH), Core (COR), Heat Structure (HS) and Flow Paths (FL) packages. The nodalisation is done consistent with MELCOR Best Practices as Applied in the State-of-the-Art Reactor Consequence Analyses (SOARCA) Process. This is a long term-term development research project aimed at ensuring that the NNR has the capacity and capability to perform SOARCA consistent the US NRC prescribed process.

The present work focuses on developing a model for the Reactor Pressurized Vessel (RPV) and the reactor core. Input data used for developing the model are mainly obtained from the original drawings and system descriptions from the Koeberg Safety Analysis Report (KSAR). This input deck will be improved continually by adding more sub-systems that are not included in this input deck, and the severe accident analysis of the KNPS will, thereafter, be performed.

Apply to be considered for a student ; award (Yes / No)?

No

Level for award;(Hons, MSc, PhD, N/A)?

N/A

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