IMPLEMENTATION OF MELCOR FOR SEVERE ACCIDENT RESEARCH AT CHALMERS

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Abstract

The understanding of the phenomenology of aerosol and fission products (FP) behaviour during a nuclear severe accident will help to predict the evolution of the source term in the containment and the possible release to the environment. Large efforts have been performed to analyse the source term behaviour under nuclear accidental conditions, especially in the containment building. For that reason, qualified tools are needed for a better understanding of its behaviour during a transient.

Most of the codes used for the evaluation of nuclear severe accident sequences simulate aerosol and FP behaviour. In this study, the MELCOR code is chosen as the main tool in the evaluation of nuclear severe accident sequences, by its capability to simulate all phases and aspects of a plant accident sequence with a comparatively economical run-time performance. MELCOR code contains models that allow simulating all phenomena for in-vessel and ex-vessel analyses.

The aim of this study is to introduce MELCOR code as an analytical code for Chalmers Severe Accident Group by simulating the experiments carried out in this group during the last years. Furthermore, analyses will have a special of the evaluation of the MELCOR Radionuclide (RN) package and its suitability for simulating the FP and aerosol behaviour in containment. Finally, the experimental results are translated into applied source term analysis of a large-scale reactor system of a Swedish NPP in case of nuclear severe accidents.

Keywords: Severe accident, MELCOR, fission products, aerosols, Swedish NPP