

## Improvement of the Thermal Hydraulic Capability of MAAP4 with Implementation of Pseudo Pressure Effect

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### Abstract

The water level decrease in core has directive effect on the following severe accident. This fact is also applied into MAAP4 calculation. MAAP4 is a code for calculation of the severe accident and the thermal hydraulics in MAAP4 plays a role to present the only boundary conditions for severe accident sequence. Thus, the thermal hydraulic models in MAAP4 are relatively simplified and MAAP4 shows some inaccuracies, one of which is about the water level prediction. To check the propriety of water level calculation of MAAP4, an experiment, called THETA, was performed and the results were compared with those of MAAP4. It is found that the decreasing rates of water level in core and downcomer are somehow deviated from the results of the experiment. After examination of the results, it was found that the fundamental weakness of MAAP4 is related to the static head balance between the core and the downcomer. MAAP4 doesn't have momentum equation set so that it cannot consider the effect of the differential pressure between core upper plenum and downcomer region. With this reason, MAAP4 predict wrong result about the distribution of water mass in the core and downcomer. To solve this problem, a correction term, named '*Pseudo Pressure Build-up Term*' was implemented into MAAP4 and the improvement of water level calculation was achieved.