

Water Film Flow Behavior Study with Nuclear Safety Simulation Computer Code

Diplomarbeit

Task description

For many current and future nuclear reactor designs, passive cooled containment by means of an evaporating liquid film combined with a natural circulation of air through the annulus between containment and reactor building is proposed. In case of a loss of coolant accident (LOCA) the passively cooled containment system limits the containment pressure by cooling the containment steel shell with water film and thus maintaining the inside condensation of steam.

COCOSYS(Containment Code System) is a best estimate and comprehensive simulation tool, with which most relevant processes and plant states during severe accidents and also design basis accidents in the containment of light water reactors can be simulated. However, in COCOSYS some typical phenomena of water film cooling are not considered. Consequently new models regarding these phenomena should be introduced into COCOSYS and these modifications should be validated with test results.

For this thesis, 3 tasks should be completed.

- 1.Application: Model the containment cooling test facility WABREC (Water Behavior in REctangle Channel) with COCOSYS code.
- 2.Validation: Compare between the results of simulation(with old water film model in COCOSYS) and test results, and validate the improved water film model (already introduced, but not validated) in COCOSYS with test results.
- 3.Modification: Improve the model one step further and validate the new model with counter current air flow test results.

Prerequisites

- Basic knowledge of Thermodynamics, Fluid mechanics and Heat transfer theory.

Start date

after consultation

Duration

4 to 6 months (depending of the scope of work)

Person in charge and contact

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