

Invited Talk - THAI database for validation of containment safety analyses codes

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Severe accident management (SAM) measures play a significant role in mitigating severe accidents in nuclear power plants (NPPs). Their proper design requires a thorough understanding of processes leading to severe accidents and the related phenomena. As SAM measures are being increasingly considered in regulation of NPPs operation, it is of utmost importance that suitable database is available for validation of safety analyses codes to facilitate a better understanding of mitigations systems performance and their impact on progression of an accident.

In support of such activities, THAI research program aims at investigating open questions relevant for safety assessment of water-cooled reactors, with specific focus on containment safety research under severe accident conditions. Experiments are conducted in the frame of national project sponsored by the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV), and international projects which run under the auspices of OECD Nuclear Energy Agency (NEA). The ongoing THAI national project involves experimental research related to water-cooled small modular reactor relevant topics, and OECD/NEA THEMIS project has a specific focus on investigating effect of late phase conditions on hydrogen risk and source term related issues, among others.

The present paper will discuss a selection of THAI experiments related to active and passive safety systems performance, impact of late phase conditions (e.g., CO, O₂ lean atmosphere), and fission products remobilization from surfaces and/or water pools. The experimental database facilitating assessment and validation of safety analyses tools towards mitigation, and management of severe accidents will be highlighted with selected examples of international code benchmarks conducted based on THAI data. Finally, planned re-orientation of THAI experimental research in the frame of future national and OECD/NEA THEMIS follow-up projects will be briefly discussed with emphasis on passive safety systems related investigations including those relevant for water cooled SMRs.

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