CFD analysis of steam jet injection inside a water-filled tank

Byong Guk Jeon[*,§], Sung-Uk Ryu[*] , Seok Kim[*], and Dong Jin Euh[*]
[*]Korea Atomic Energy Research Institute,
989-111 Daedeokdaero, Yuseong, Daejeon, 305-353, Korea
[§]Correspondence author. Fax: +82 42 868 8362   Email: bgjeon@kaeri.re.kr

ABSTRACT In the safety water injection system of an advanced nuclear power plant, steam is injected onto a water inside a tank called hybrid SIT. Depending on the condensation rate of steam and the rise time of pressure inside the tank, the performance of the system is determined. To understand the phenomena, an experiment with visualization as well as finely installed instrumentation was conducted. In parallel, simulation of the steam jet development and subsequent condensation was performed using a CFD code, STAR-CCM+. Each phenomenon was validated first against other experiments; then, simulation on our hybrid SIT experiment was conducted. In the simulation, three domains of gas (steam and air), water, and wall were considered. As a result, pressure and temperature trends were compared between experiments and simulation. The sensitivity of the condensation model was identified.