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Prediction of thermal hydraulic characteristics inside the storage tank of a horizontal condensation heat exchanger using MARS-KS
BYUNG SOO SHIN, KWANG WON SEUL, KYU SIK DO, Korea Institute of Nuclear Safety, REACTOR SYSTEM EVALUATION TEAM — The performance of a horizontal condensation heat exchanger is determined by the condensation heat transfer inside the heat exchanger tubes, convective or boiling heat transfer outside the tubes and flow characteristics in the storage tank. The flow characteristics in the tank are important factors to determine the heat transfer rate outside the tubes. The objective of this work is to develop the method to predict the heat transfer rate outside the tubes properly using MARS-KS code. Two different results from MARS-KS were compared with simplified experimental results in other works to estimate the capacity of MARS-KS. One was by a typical 1D nodalization but another was by a 3D nodalization considering natural circulation in the storage tank. Then, to eliminate the effect of condensation heat transfer inside the tubes, the experimental results on temperature profiles were applied to the inside wall of tubes as boundary conditions. As the result, the 3-D nodalization model had good predictions with experimental results in regard of wall temperature, heat flux and heat transfer coefficients. It was also confirmed that the natural circulation flow was developed inside the storage tank.

Byung Soo Shin
Korea Institute of Nuclear Safety

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