

Improvement of Safety Analysis Methodology for CANDU Reactors:
Off-take Experiment at T-junction between Header and Feeder Pipes
with Arbitrary Angles in CANDU

Gi-Suk Hwang and Jae Young Lee
Han Dong Global University,
Pohang, 791-708, KOREA

Young Min Moon and Hee Cheon NO
Korea Advanced Institute of Science and Technology,
373-1, Guseong-dong, Yuseong-gu, Daejeon, 305-701, KOREA

Sun Oh Yu, Manwoong Kim and Hyo Jung Kim
Korea Institute of Nuclear Safety,
19, Guseong-dong, Yuseong-gu, Daejeon, 305-338, KOREA

Abstract

An experimental study has been performed to investigate the off-take phenomena at the horizontal pipe with the branch pipes installed between the header pipe and feeder pipe in CANDU 6. The horizontal stratification entrainment model (HSEM) in RELAP5/MOD3.3 is developed based on data generated for only three branch orientations (top, side, bottom). This study shows whether it can be applied to the branch pipes with actual angles and supports experimental data for the improvements of model applicable to the geometric effect of branching angles. Scaling analysis is performed to scale down the experimental facility to CANDU 6. Three different diameters and seven different angles of branch pipes are used to verify their scale and geometry effects. The off-take phenomena - liquid/gas entrainment - are observed for various angles between the header pipe and feeder pipe. The HSEM used in RELAP5/MOD3.3 and the experimental results of previous studies are validated by the present experimental data at the only three branch orientations. The data of onset of off-take shows agreement with the existing correlations while the quality data show discrepancies in the top and bottom branches. For specific angled branches, the onsets of off-take data are only obtained. Especially, the HSEM does not show good agreement of the present onset data of the specific branch angles, $\pm 36^\circ$ and $\pm 72^\circ$.