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Monthly Highlights

for

May 1980*

TRAC Assessment and Model Development

NRC FIN No. A-3215

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*Work carried out under the auspices of the United States Nuclear Regulatory Commission.

3. TRAC Assessment and Model Development

3.1 University of Houston Flooding Tests (U. S. Rohatgi)

It was stated in a recent BNL quarterly that the TRAC-P1A "SLIP" routine which is used for the loop components could handle the counter-current flow in the annular and the churn-turbulent regimes only if the mixture velocity is positive or going against gravity. Upon further investigation it was found that TRAC-P1A could not compute counter-current flow even for these conditions since the gas and the liquid velocities would always have the same sign. The code will, therefore, compute counter-current flow only in the bubbly and the slug flow regimes. Therefore, it is concluded that TRAC-P1A cannot compute the University of Houston flooding tests (for which the void fractions are greater than 0.9); and no attempts will be made to simulate them with TRAC-P1A.

3.2 Marviken Critical Flow Tests (U. S. Rohatgi and Y. Sanborn)

Marviken critical flow Tests 22 and 24 were run with a TRAC-P1A version containing the Alamgir-Lienhard correlation for delayed flashing. Test 24 ran only slightly slower than with the original version of TRAC-P1A and predicted the magnitude of the early pressure dip well. However, Test 22 ran very slowly, and the reasons for it are being investigated.

3.3 Battelle Institute (Frankfurt-Main) Vessel Top Blowdown Test (L. Neymotin)

The "SLIP" subroutine of TRAC-P1A has been slightly changed to increase the relative velocity by 25 percent. This resulted in better agreement in the prediction of the two-phase mixture level in the vessel during a blowdown. However, it should be kept in mind that a slight change in the initial water

temperature (as revealed in the experimental data) can also improve the prediction of the two-phase mixture propagation in the vessel. Therefore, it is not clear which of these parameters are more important for accurate predictions of the experiments.

3.4 RPI Phase Separation Tests (U. S. Rohatgi)

As stated in the last monthly highlight letter, the work on the single-phase (air) flow through the RPI Test 8 (with rods and two outlets) has been continued to see if TRAC-P1A predicts symmetric flow. Even though LASL's suggestions for corrections in the TF3DE routine were incorporated, there was little difference in the results. Further investigation of the problem of asymmetric flow, has been set up for two cases. In the first case an extra column of cells was added to the left of the test section to reduce the effect of the radius. This cell did not have any flow communication with the test section. The results obtained for this case were different; the flows oscillated around the correct solution. In the second case, the innermost cell radius was changed from 0.0 to 20.0 m in TF3DE and the solution reached a steady-state condition. However, the flows from both outlets were still asymmetric and were the same as the "original" TRAC-P1A calculations. We are still looking into the cause of this asymmetry.

3.5 Creare Downcomer Test (U. S. Rohatgi and L. Barello)

An input deck for the Creare Downcomer Test as described in LASL's report entitled "TRAC-P1A Developmental Assessment" (NUREG CR-1059) has been set up and is being debugged. This input has to be modified only slightly to run the tests assigned to BNL.

3.6 Other Related Activities (P. Saha, Y. Sanborn, and L. Barello)

At the request of Dr. Y. Y. Hsu of USNRC, sample calculations were performed to estimate the frictional pressure gradient in a PWR hot leg during a small-break LOCA. A parametric study revealed that the magnitude of the pressure gradient would be in the range of 10-100 N/m^2-m. The details of the calculation are being transmitted to Dr. Hsu under a separate cover.

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