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Monthly Highlights

for

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TRAC Assessment and Model Development

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TRAC Assessment and Model Development

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

It was stated in the last quarterly that the TRAC-P1A one-dimensional formulation cannot simulate this countercurrent flow test due to an inadequate description of the relative velocity in the annular flow regime. Therefore, the two-fluid formulation of TRAC-P1A was investigated to see if it could predict the test. It was found from the preliminary analysis of the test data that the interfacial shear coefficient needed to calculate the experimental conditions is four to five times higher than the one in the code. This agrees with the conclusion reached by the LASL personnel when they simulated the countercurrent flow tests of Dartmouth College. These tests will be simulated with TRAC-PD2.

2. Super-CANON Experiments (P. Saha)

The sensitivity of TRAC-P1A predictions to the initial water temperature has been studied for the Super-CANON test with a full-open discharge end and an initial water temperature of 280° C. In order to achieve a good prediction of the short-term pressure history, the initial water temperature for the TRAC calculation was taken as 270° C. This temperature is 10° C lower than the average initial water temperature of the test, and 8° C lower than the minimum temperature recorded by any thermocouple at the start of the transient. With this hypothetical initial water temperature of 270° C, TRAC-P1A predicts the short-term ($t < 0.1$ sec) pressure history quite well. However, the pressure thereafter is underpredicted like the original TRAC-P1A prediction.

The value of the void distribution parameter, C_o, was then changed from 1.1 (the original TRAC value) to 1.01 to reduce the relative velocity. The initial water temperature was still kept at 270° C, 10° C lower than the experimental value. The resultant TRAC prediction was in close agreement with the data for the entire period of transient. However, it must be kept in mind that two input changes, one of which is highly artificial, were needed to produce the good agreement. This confirms our previous observation that further examination of the TRAC models for nonequilibrium phase change and relative velocity is required.

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

A topical report on the simulation of this test with TRAC-P1A is being written.

4. RPI Phase Separation Test (U. S. Rohatgi)

The simulation of the remaining four high quality inlet flow tests with TRAC-P1A has been completed, and the conclusions drawn in the previous quarterlies still stand. All four of the tests failed to converge to a steady-state. The code still produced an asymmetric solution for the two tests with symmetric boundary conditions and two outlets. Furthermore, the code stopped computing due to overflow conditions for the remaining two tests with one outlet.

5. FRIGG-Loop Forced and Natural Circulation Tests (L. Neymotin)

Possible causes for TRAC's failure to reach a steady-state with the two-fluid formulation have been found using the results obtained recently for FRIGG Tests with one-dimensional "vessel" module. A BNL memo on this subject has been prepared. Complete 3-D calculations have not been performed due to the present shortage of funds for computer time.

A topical report on the FRIGG Test simulations with TRAC-P1A is currently being prepared.

6. <u>TRAC-PD2 Implementation</u> (G. Slovik)

The TRAC-PD2, as received from LASL, is being implemented at BNL.

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