Modeling Important Phenomena

One useful step for developing a good model is to identify key performance parameters or variables that are of primary interest for the accidents to be simulated.

Once the key performance parameters are specified, the phenomena that significantly impact the key performance parameters should be identified and represented in the model in order to produce reasonable simulation results.

Identification of relevant phenomena comes from theory and experimental data. In addition, a PIRT (Phenomena Identification Ranking Table) which is developed by field experts identifies and ranks important phenomena for a particular accident type. When available, a PIRT can be useful for making decisions about what to include in a model to adequately predict the physical behavior.

Modeling Important Phenomena

Sometimes it is not clear whether a certain phenomenon is important. If boundary and initial conditions can be adequately defined, simple separate-effects models can be useful for judging the sensitivity of the key parameters to different phenomena.

The modeling exercise accompanying this presentation is based on MIT Pressurizer Test ST4. In this experiment, pressure is the key performance parameter we are interested in. Experimental data will be directly included in the model to facilitate comparisons for determining whether the important phenomena have been adequately simulated. A description of the experiment is given in the slides that follow.

TRACE Assessment using Experimental Data

MIT Pressurizer Test ST4 Assessment Exercise

- Test Description
- Observed Behavior
- Assessment

TRACE Assessment using Experimental Data

Test Description

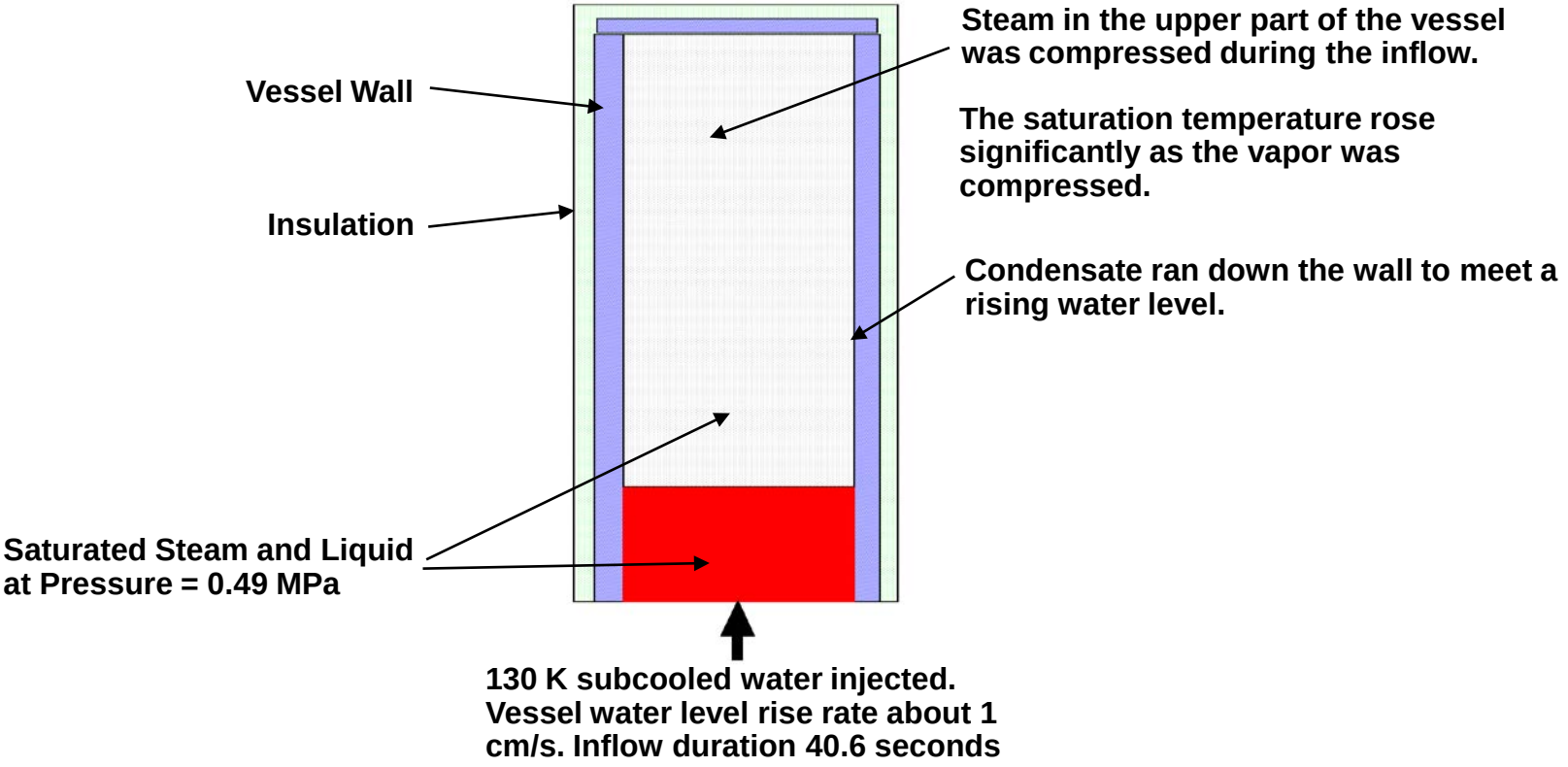
Test ST4 was an inflow experiment in a vertically-oriented insulated stainless steel test vessel (pressurizer), 1.134 m high and 0.203 m in diameter.

Water, at 130 K below the saturation temperature, was injected into the bottom of the vessel, which initially was partially filled with saturated water at a pressure of 0.49 MPa.

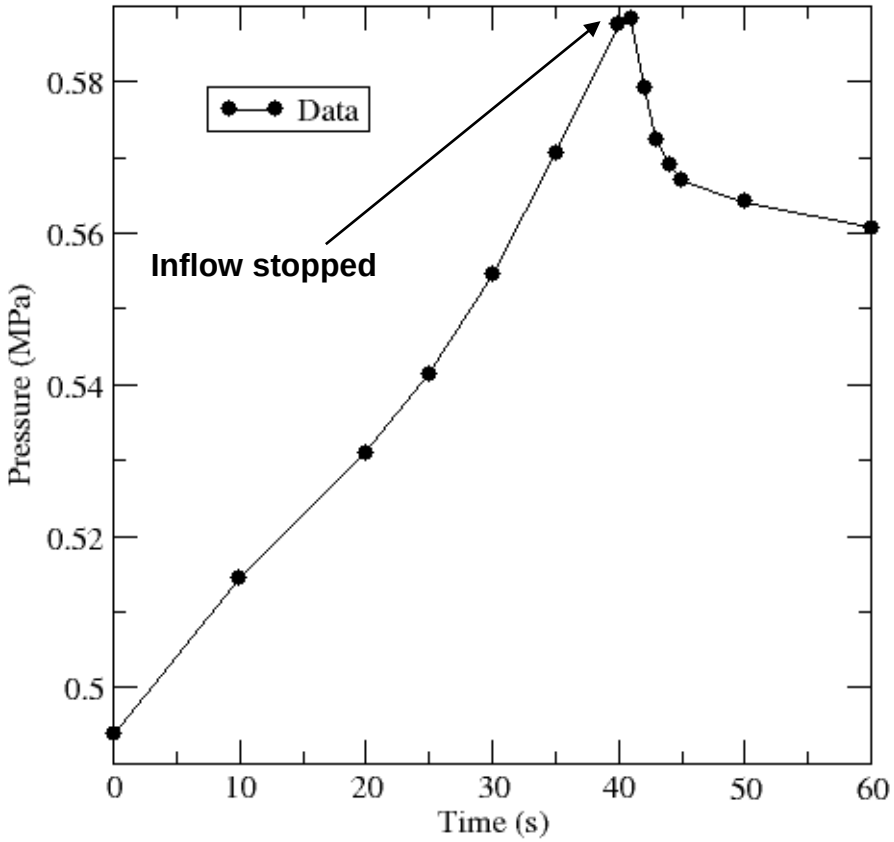
Duration of the inflow was 40.6 seconds at a vessel water level rise rate of about 1 cm/s.

TRACE Developmental Assessment using Experimental Data

Observed Behavior



TRACE Assessment using Experimental Data



Measured pressure response at the top of the vessel.

TRACE Assessment using Experimental Data

Assessment Exercise:

How well does the TRACE code predict the *Pressure* rise and subsequent decline for MIT Pressurizer Test ST4

Objectives:

1. **Use the SNAP environment to create, run and analyze a TRACE prediction of the test.**
2. **Make additional model input modifications if needed and re-analyze.**

Refer to "MITPressurizerTestST4Exercise.pdf" on the accompanying CD under "Day2\Morning\MIT_Pressurizer\" (or the printout in the workbook) for the instructions for performing this exercise.