



# Analysis Techniques

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## MIT Pressurizer Test ST4 Assessment Exercise

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# Analysis Techniques

In the context of this course, **analysis** is the detailed examination of TRACE simulations or experimental data for the purpose of understanding and interpreting results.

Analysis is an important skill for identifying modeling errors and assessing adequacy of results.

Skill in analysis is one factor that helps differentiate a novice TRACE user from an intermediate or expert user.

## Analysis Techniques

The difference between a novice and an expert is not necessarily in the facts they know, but rather in their ability to filter out unimportant information and focus in on the most important and relevant information.

Experience plays a significant role in developing skill in analysis, but expertise can be developed faster if useful techniques are applied that help refine thinking.



## Technique 1 - Gain Familiarity

Given a transient simulation or experimental data, a first step in analysis is to get familiar with the behavior of the transient. Common practices are:

1. Generate an events table that highlight key events that impact the transient response.
2. Tell the story – qualitatively examine the system response. Try to explain the cause of the behavior that you see.
3. For a transient with experimental data, identify any significant differences in response. Or identify trends that you don't understand. These signal places to look more closely at the behavior.

# MIT Pressurizer Test ST4 Description

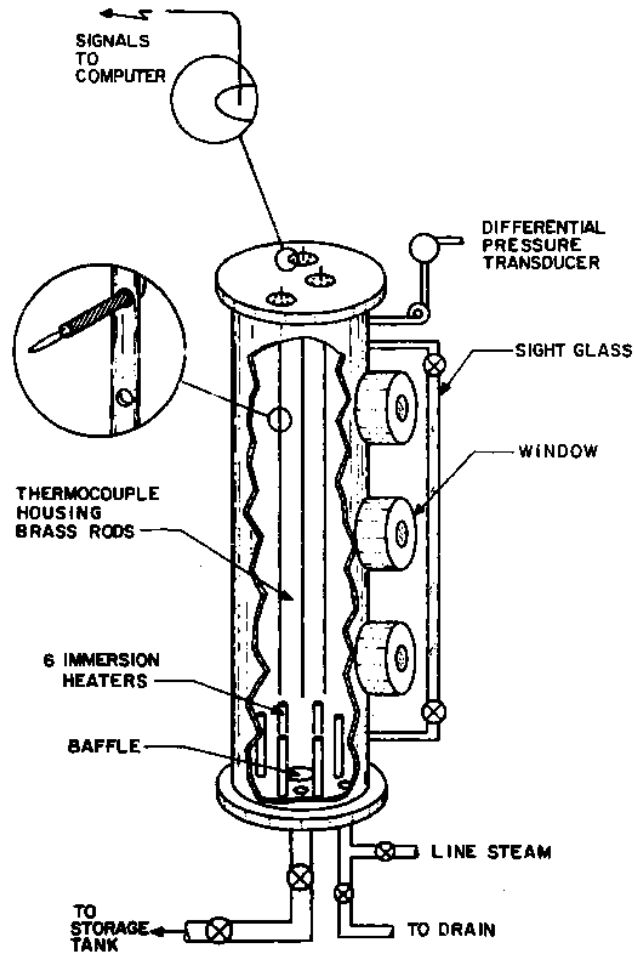
**Test ST4 was an inflow experiment in a vertically-oriented insulated stainless steel test vessel, 45 in (1.134 m) high, an inner pipe diameter of 8 in (0.203 m), and wall thickness of 21/64 in (0.833 cm).**

**The vessel contained saturated steam and was initially filled to a level of 17 in (0.43 m) with saturated water at a pressure of 71.5 psia (0.49 MPa).**

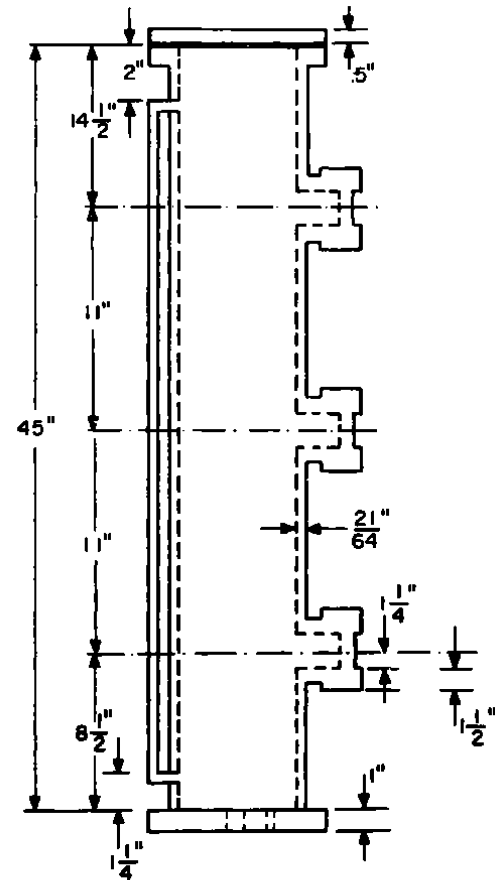
**Water at 70 F (294 K) was injected into the bottom of the vessel. The duration of the inflow was 40.4 seconds at a vessel water level rise rate of about 1 cm/s.**

**For reference, the MIT pressurizer report is included in this folder as MIT-PRZR-Test(withST4).pdf**

# MIT Pressurizer Test ST4 Diagrams



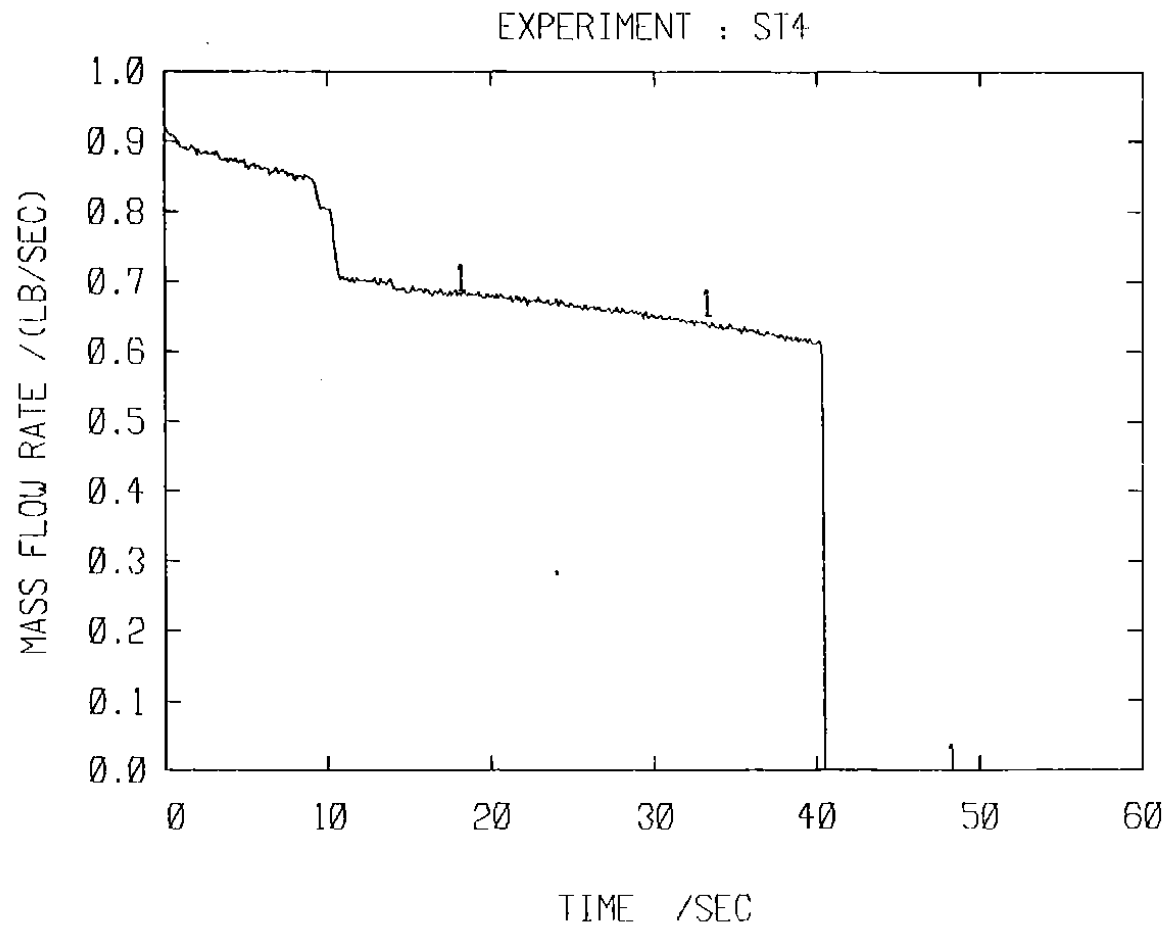
SCHEMATIC DIAGRAM OF PRIMARY TANK



Schematic Diagram of Main Tank

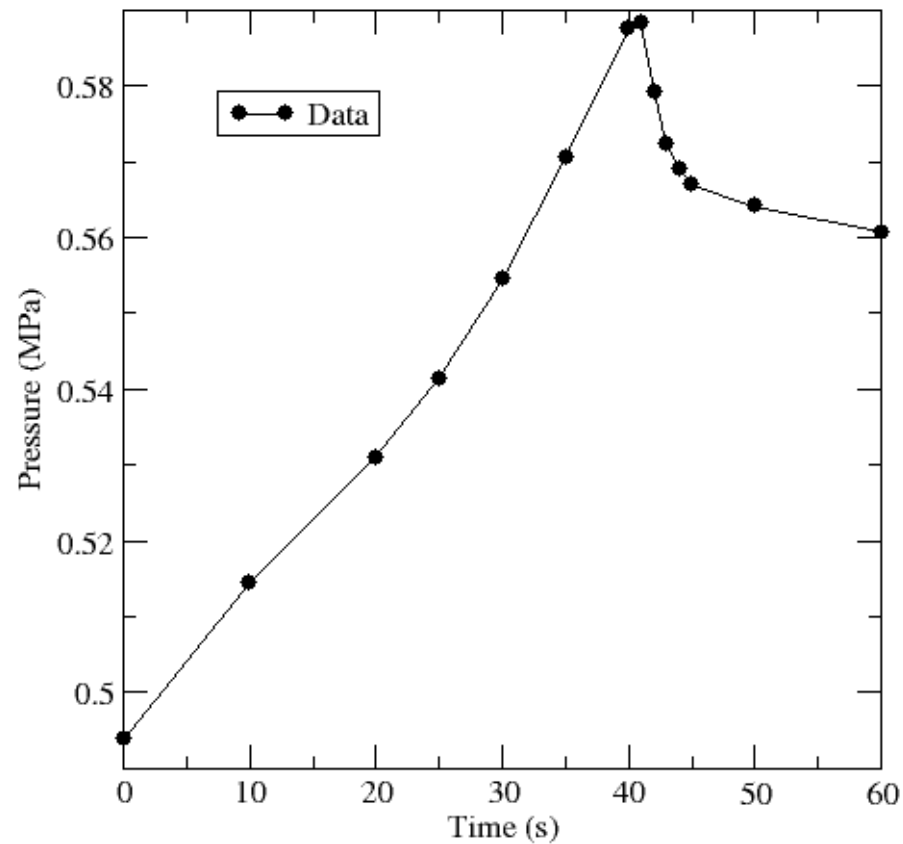


# MIT Pressurizer Test ST4 Mass Influx Rate





# MIT Pressurizer Test ST4 System Response



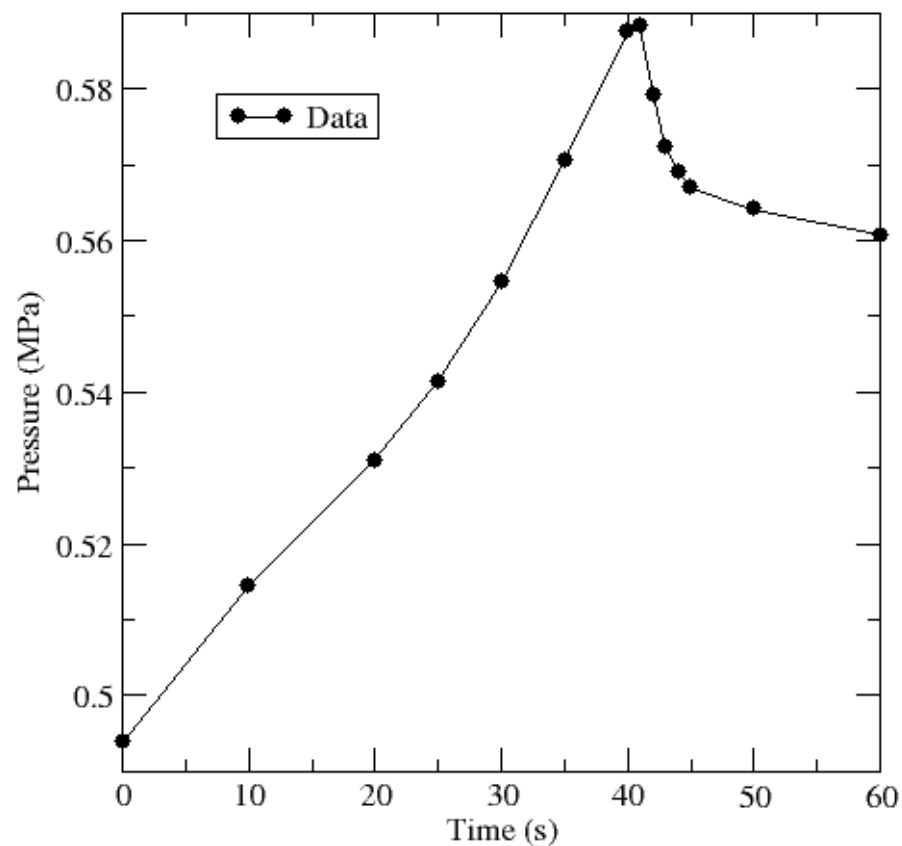
**Measured system response at the top of the vessel**



# MIT Pressurizer Test ST4 Qualitative Analysis

What is the behavior we are seeing here?

Any unusual trends in the data that need explanation?



What information is need to model this experiment?

Geometry Info:

Materials Info:

Initial Conditions:

Boundary conditions:

Is there any information we are lacking?

# Initial Model Configuration

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This is a simple model that we can build from scratch. However it is common practice to start with a model that you did not build as a starting point.

When you did not build a model, analysis skills are sometimes needed to understand, explore, and possibly correct the model behavior.

We will start with a prebuilt model and do a quick examination of the model results.



## Exercise 1

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With a little exploration, you could probably find and fix problems in the model.

However, the intent of the exercise is not to fix the problems per se, but to give you experience doing this using a specific analysis technique to identify and fix issues. So please follow the instructions, but wait to examine the model in more detail.

Open the first MIT Pressurizer exercise from the PDF file `MITPzrTestST4Exercise1.pdf` and follow the steps outlined.