

LABORATORY II

BAE 5413

SPRING 2007

Preliminary work:

OBJECTIVE: Selection and calibration of a thermistor and circuit

PROCEDURE: Read the resource material on application of NTC thermistors (NTC Thermistors, Thermometrics, Inc.) Select and test a thermistor circuit that can be used to transduce temperature to voltage. Use the thermistor provided in your instrumentation kit. Calibrate the circuit against the thermocouple and voltmeter in your instrumentation kit. You may use an ice-bath to generate a freezing point reference.

TITLE: Determination of Dynamic Response

OBJECTIVE:

To experimentally identify the dynamic characteristic of thermistors in air and in water

PROCEDURE:

Step testing or frequency testing may be used to determine dynamic system properties. Time constant and damping ratio can be used to describe characteristics of dynamic systems. Both constants can be determined through experiment. The following laboratory focuses on determination of time constants for overdamped dynamic systems. Two thermistors have been selected for study, the fast reacting thermistor in your instrumentation kit which has a time constant of near 2 seconds in air, and another slower reacting thermistor of unknown time constant(s). You may use the circuit that you designed earlier for both thermistors.

This circuit should be used for conversion of thermistor signals and the output may be connected to a digital storage oscilloscope which may be used to acquire response data. The voltage data will represent temperature response of a thermistor. The thermistors can be subjected to temperature inputs and dynamic response determined.

Use a step test in water to determine the time constant of both the fast and slow thermistor in water. Use % incomplete response analysis to determine time constants for the slow thermistor. Draw a conclusion regarding whether a first or second order model is appropriate for this thermistor.

REPORT:

Briefly report the above work. Include a short introduction describing the purpose of the work. Describe the theoretical procedures and the mathematical procedures. Finally, report the results of the work. Include a discussion of the potential effect of testing the thermistor in a different media, air for example. Include an abstract on the front page of the report that includes a title, your name. The abstract should encapsulate the critical points of the study.