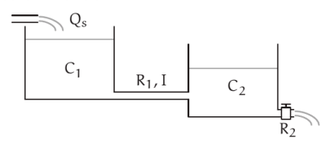
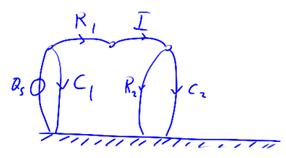
thermoflu.exe Exercises for Chapter thermoflu

Exercise thermoflu.tinker

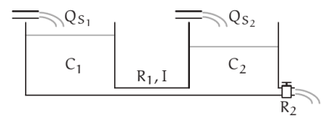
Draw a linear graph of the fluid system with schematic below.





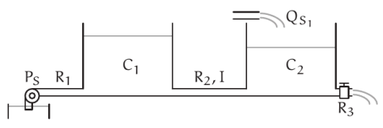
Exercise thermoflu.tailor

Draw a linear graph of the fluid system with schematic below.



Exercise thermoflu.soldier

(a) Draw a linear graph of the fluid system with schematic below. (b) Draw a normal tree and identify the state variables and system order.



Exercise thermoflu.tpain

Consider an apparatus with two chambers filled with gas at potentially different temperatures illustrated in Fig. exe.1. Temperature sensors are embedded in the two "sensor blocks," made of copper for low thermal resistance and made large enough to provide enough thermal capacitance to smooth out temperature fluctuations.[4] The "structural conduit" is made of steel, less thermally conductive, but conductive nonetheless. The conduit provides structure to the apparatus and is hollow to allow the sensor wires to run through.
A concern with this apparatus is that the temperature in one chamber will affect the temperature in the other, most conspicuously by heat conducting through the structural conduit. We will begin an analysis of the thermal isolation of the two chambers and temperature measurements. Develop a thermal lumped-parameter model as follows.

a. Describe the lumped-parameter elements you will use to model the system.
b. Draw a linear graph of the lumped-parameter model.
c. Superimpose a normal tree on the graph, identify the system order, and choose the state variables.

_____/25 p.

4. This technique of adding capacitance for smoothing a signal is useful in all energy domains!

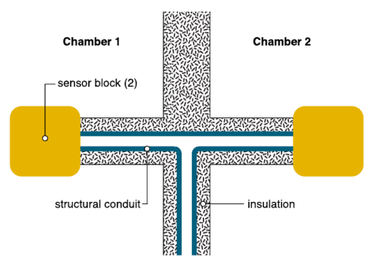


Figure exe.1: a diagram of the two-chamber apparatus.

Part IV

Fourier analysis

four

Fourier series and transforms