

Assignment 3

Due 9/25/2025

Short Answer Problems

1. Explain the difference and give examples of the two mesh numbering formats that can be used on heat structures (These are the formats that are specified on card 1CCCG100)
2. Name the horizontal and vertical flow regimes that RELAP uses in calculations.
3. Explain what form losses are and how they are used in RELAP5-3D

Application Problem

Create a nodalization diagram for a shell and tube heat exchanger that has 1000 1" tubes and a 42" shell. Include inlets and outlets for the tubes and the shell. The tubes and shell are a total of 5m long and each need to have 20 volumes. Now create an input deck showing the two separate systems (soon we will learn about heat structures and how to couple these systems, for now, create them as two separate systems). You should run this deck and edit until there are no errors returned. For all temperatures and pressures just use 300K and 101325 Pa. Start all flows at 0.0 (we will change all these values later but for now we just want a working template). Turn in your nodalization diagram, your input deck and your output file showing no errors.

Project Problem

Create a preliminary nodalization diagram of your proposed reactor. Create a simple initial primary loop for your selected reactor in RELAP5-3D (using excel to store your various parameters) but using a time dependent volume instead of a pump, and neglecting heat structures (i.e. including only fluid volumes, no thermal parameters). Run and debug this model and submit a printout of the MAJOR output after 20 seconds.