

Homework Assignment Number Eleven
Assigned: Wednesday, April 7, 1999
Due: Wednesday, April 14, 1999 BEFORE LECTURE STARTS.

Problem 1. Geankoplis 4.9-2, page 323

Problem 2. Geankoplis 4.9-3, page 323

Problem 3.

In Homework Assignment 11, it turns out that the code used for heat exchangers that I provided on the website did not converge for large temperature differences in the heat exchanger. I believe that parts (b) and (c) of problem (3) could not be done using that code.

We had been making our new guess for the outlet shell and tube temperatures by saying:

$$T_{shellout} = T_{shellin} + q/\dot{m}_{shell}/C_{pshell};$$

$$T_{tubeout} = T_{tubein} - q/\dot{m}_{tube}/C_{ptube};$$

This estimate for new outlet temperatures works only for small changes in temperature. I have developed version 2 of the heat exchanger program which calculates new guesses for the outlet temperature using a better estimate, based on a convergence scheme known as the "Bisection Method". I believe this code will now work for any change in temperature so long as the minimum temperature of the hot fluid is greater than the maximum temperature of the cold fluid at any point in the reactor.

I have provided version 2 of the heat exchanger code on the website in the MATLAB code section. Repeat parts (b) and (c) of problem 3 from Homework Assignment (10) with this code.

(You ought to use this same code to do problems 1 and 2 in this homework set.)