University of Kentucky
Chemical & Materials Engineering Department
CME 550: Chemical Reactor Design
Homework 7

Due at *beginning* of class on Friday November 4, 2005
Partial credit will be given in ½-point increments.

1) Based on a mole balance for a MFR, we determined in class that the startup equation for concentration in a MFR vs. time is given by:

$$C_{A1} = \frac{C_{A0}}{1+k\tau}\left(1-\exp\left[-(1+k\tau)\frac{t}{\tau}\right]\right)$$

This equation will be the same for the first MFR in a series of reactors.

   a. For two MFRs in series, derive an expression for the concentration in the second reactor as a function of time. [2 pt]

   b. For a reaction with a rate constant of 0.15 s^{-1}, 6 L/min of a solution containing 0.5 mol/L of A is fed into a pair of 1-liter MFRs in series. Calculate the time to reach 95% of the steady-state concentration in each reactor. Plot C_{A1} and C_{A2} vs. t up to the longer time. [1 pt]

2) Levenspiel 7.9 [1 pt]

3) Levenspiel 7.16 [2 pt]

4) Levenspiel 7.26 parts a-c [2 pt]

5) Levenspiel 8.2 [1 pt]

6) Levenspiel 8.5 [1 pt]