CE 329, Fall 2015

Assignment 12 Solution

Problem Statement

A 5 gal bucket of red dye at a concentration of 5 M was dumped into the inlet of a pilot plant reactor. The reactor volume is 95 L and the liquid feed flows at a rate of 0.65 gal min^{-1}. At the same time, a spectrophotometer began analyzing the outlet stream from the reactor. The signal from the spectrophotometer is directly proportional to the concentration of the dye. The table below reports the ratio of the instantaneous spectrophotometer signal to that prior to the addition of the dye. On the basis of the data that were obtained, do you believe that the reactor can be accurately modeled as a plug flow reactor?

time (min)	signal
1	-0.01
10	-0.01
20	0.05
30	0.02
35	0.09
36	-0.03
37	15.40
38	9.41
39	5.72
40	3.60
41	2.10
42	1.25
43	0.81
44	0.46
45	0.30
50	0.04
55	0.01
60	-0.03