

GLY 4822, Assignment 10

1. Use StAnMod/CXTFIT to fit the CDE to fit the velocity and dispersion coefficients for the tracer test data provided on the web. Use both the rising and falling salt concentration data and compare and contrast the results. Include an explanation for the difference. Provide the first page of your output file and a graph showing the data as open symbols and the fitted analytical solution as a solid line as part of your report.

Values in the file are time in seconds and concentration in voltage (proportional to concentration) units. Normalize the concentration data to between 0 and 1 using the methods we discussed in class. You may need to eliminate zeros and negative numbers to use the results in StAnMod/CXTFIT. You will probably have to use only a fraction of the data points (every tenth point?).

You can make an initial guess for velocity using $x = vt$ and noting the time t when the salt first appears in the effluent from the column; it has traveled the length of the column or $x = 10$ cm.

Base your initial guess for D on the following rule of thumb for the dispersivity α : $\alpha = 0.1 * \text{length scale of problem}$, where the length scale for our problem is the length of the column, 10 cm. Then use the relationship between D and α : $D = \alpha v$.

The initial condition will be $C(x,0) = 0$ (for salt water entering the fresh water-filled column) or $C(x,0) = 1$ (for fresh water entering the salt water-filled column).