

Project 2

(1/30/25, due 2/6/25)

1. An advection model (*advec1.f90*), which is written in FORTRAN 90, solves an one-dimensional advection equation numerically.

Download the advection model from the MesoLab website: (Project 2 *advec1.f90*).

2. Adjust the flag "NPR" to run longer, e.g., twice longer than the control case, and write out the data for more time steps (e.g., 20 outputs). Then, use grads to plot the output and make a movie for the animation. Document the evolution of the wave motion, such as changes in the initial bell-shaped wave. Try to explain why.
3. Run a sensitivity test by changing NL to 1 (i.e., nonlinear) and then compare the results with the control experiment (NL=0) as performed above. Then use GrADS, which was provided in Project 1, to plot the output and make a movie for the animation. Construct a table to document the differences between the nonlinear and linear cases and try to explain the nonlinear effects on the initial wave.

*** In your Project 2 Report, please submit the following documents:**

- (1) A Word version of the report.
- (2) Make movies of your plots and then email the movies (in movie format; otherwise nobody can watch them). There should be 2 movies, one for the linear case and the other for the nonlinear case.
- (3) Item (2) applies to the static plot(s) on the Project Report, i.e. you need to plot both linear and nonlinear cases.