

Assignment #8

Due *Friday April 8, 2005*.

1. Read sections 4.6, 4.7, 4.8, 4.9, 4.10, 4.11.
2. Figure 4.8 in MORTON & MAYERS shows an exact and approximate solution to the linear advection equation (4.33) with initial-boundary condition (4.34) and initial data (4.45). The approximate solution in figure 4.8 is by Lax-Wendroff.
For comparison purposes, produce a figure as similar as possible to figure 4.8 but using the *upwind method*. (Note you will use the exact characteristics (4.35b) to plot the exact solution.) Once you have produced the figure, compare, in several sentences, to figure 4.8 using the ideas in the text (i.e. truncation error, maximum principle, damping of high frequency modes, relative phase error).
3. Show that equation(s) (4.65) in MORTON & MAYERS reduce to (4.59) in the case $\mathbf{f} = A\mathbf{u}$ with A constant. Furthermore, show that if there is only a single equation (i.e. $f = au$) then (4.65) and (4.59) reduce to (4.37) or (4.36).