ME – 733 CFD

Programming Assignment 3

Consider a shock wave propagation of a certain wave at certain times, by Solving the linearized wave equation:

$$\frac{\partial u}{\partial t} + c\frac{\partial \mathrm{u}}{\partial \mathrm{x}} = 0$$

A shock wave moving within 300 m starting with 2 m/s for 50 m and the rest space is shocked with 1 m/s speed. And the wave is moving with 300 m/s speed. We are going to study the behavior of that wave within different times and different stability conditions.

where c = 300 m/s starting with initial condition of a shock wave (discontinuity defined as :-

u = 2 m/s for X < 50 m

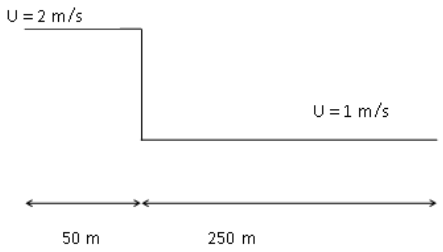
u = 1 m/s for X >= 50 m

With boundary conditions

u = 2 m/s for X = 0 m

u = 1 m/s for X = 300 m

Plot the wave at times t = 0, 0.15, 0.3, 0.45 s, using upwind, Lax,Lax-Wendroff, Maccormack, Crank-Nicolson scheme.

For each scheme try the following CFL number

1. υ=.5 2. υ=1 3. υ=2