

November 20, 2003

hw09a

Solution of Burger's equation

Use MacCormack's method to solve inviscid Burger's equation using a mesh with 51 points in the x-direction. Solve the equation for a right propagating discontinuity with $u = 1$ at the first 11 nodes and $u = 0$ at the rest of the nodes.

Use Courant number ($C = u\Delta t/\Delta x$) = 0.5.

Solution

MacCormack's method

$$\bar{u}_j^{n+1} = u_j^n - \frac{\Delta t}{\Delta x} (F_{j+1}^n - F_j^n)$$

$$u_j^{n+1} = \frac{1}{2} \left[u_j^n + \bar{u}_j^{n+1} - \frac{\Delta t}{\Delta x} (\bar{F}_j^n - \bar{F}_{j-1}^n) \right]$$