L #31

The four basic equations for CFD are:

1) mass conservation equation
2) momentum conservation equation
3) energy conservation equation
4) and an equation of state

variables:

position , x [cm]
specific volume , $\forall$ [cm^3/g]
specific internal energy , E [erg/g]
pressure , P [$dyne/cm^2$]
velocity , u [cm/s]

Discretization

$$dE = -p\, d\forall \;, \quad \Delta E = -p \Delta \forall$$

$$E_{j-1/2}^{n} - E_{j-\frac{1}{2}}^{n-1} = -P_{j-1/2}^{n} V_{j-1/2}^{n} + P_{j-1/2}^{n-1} \forall_{j-1/2}^{n-1}$$

$$E_{j-1/2}^{n} = E_{j-1/2}^{n-1} + P_{j-1/2}^{n-1} V_{j-1/2}^{n-1} - P_{j-1/2}^{n}$$