

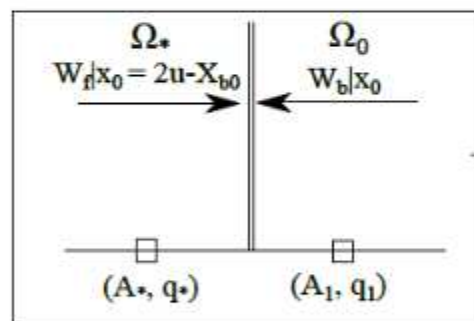


Vessel

Vessel Network

$$u_t + F_x = S$$

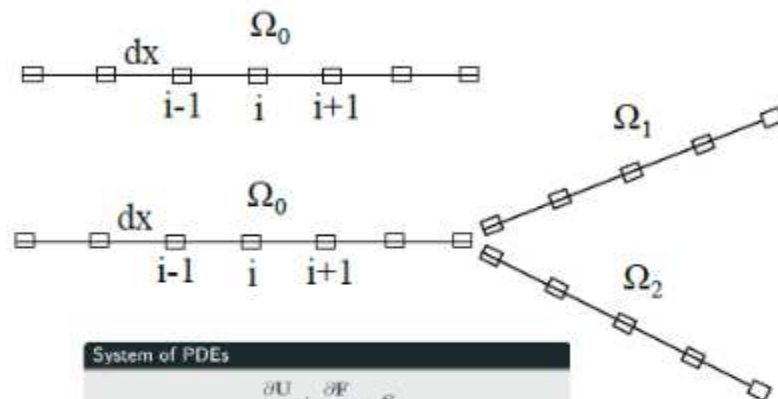
PDEs system



Boundary Cond.

Solver

Visualiser



System of PDEs

$$\frac{\partial U}{\partial t} + \frac{\partial F}{\partial X} = S$$

$$U = \begin{bmatrix} A \\ u \end{bmatrix}, \quad F = \begin{bmatrix} uA \\ \frac{u^2}{2} + \frac{p}{\rho} \end{bmatrix}, \quad S = \begin{bmatrix} 0 \\ \frac{1}{\rho} \frac{\partial \sigma_{xx}}{\partial x} \end{bmatrix}$$

FD

$$U_i^n = U_i^{n-1} - \frac{\Delta t}{\Delta x} (F_{i+1}^n - F_i^n) + \Delta t S_i^n, \quad i = 2, \dots, N$$

$$U_i^{n+1} = \frac{1}{2} (U_i^n + U_i^{n*}) - \frac{\Delta t}{2\Delta x} (F_i^n - F_{i-1}^n) + \frac{\Delta t}{2} S_i^n$$

FE

$$\left(\frac{\partial U_h^k}{\partial t}, \psi^k \right)_{D_h} + \left(\frac{\partial F_h^k}{\partial x}, \psi^k \right)_{D_h} = (S_h^k, \psi^k)_{D_h}$$

