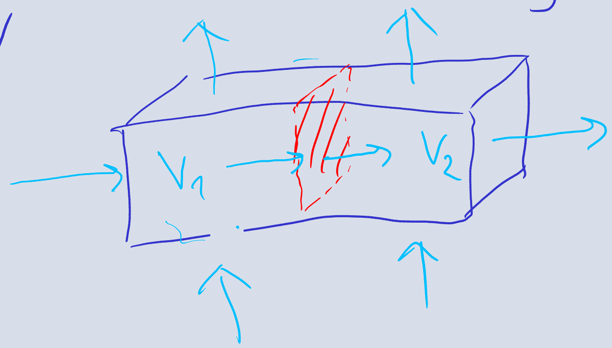
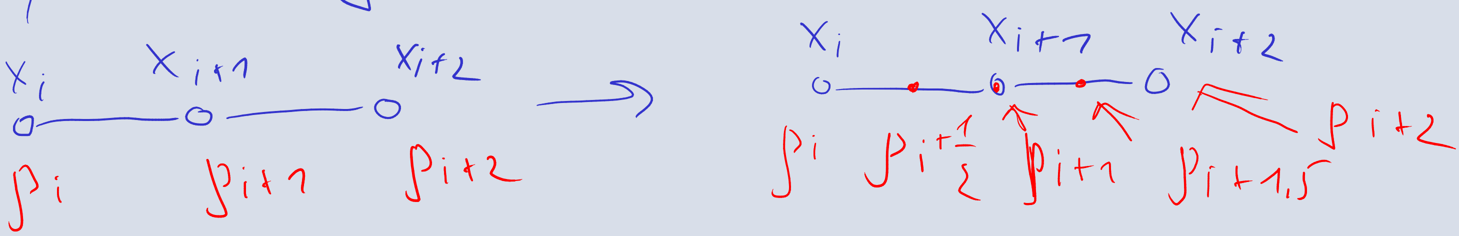
1) Теорема Остроградского — Гаусса

$$\int_V \nabla\cdot\vec{F}\,dV = \int_S (\vec{F}\cdot\vec{n})\,dS$$



2) Метод конеч. объемов



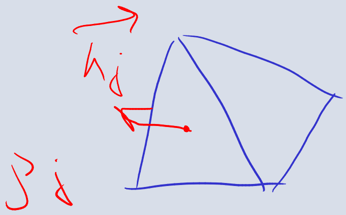
$$\rho_t + v\,\rho_x = 0$$

$$\underbrace{\int_{x_i}^{x_{i+1}} \rho_t(t,x)\,dx}_{/\Delta x} + v\underbrace{\int_{x_i}^{x_{i+1}} \rho_x(t,x)\,dx}_{/\Delta x} = 0$$

$$\Delta x\cdot\bar{\rho}_t(t,x_i) + v(\rho_i(t) - \rho_{i+1}(t)) = 0$$

$$\bar{\rho}_t(t) = -\frac{v}{\Delta x}(\rho_i(t) - \rho_{i+1}(t))$$

$$\underbrace{\bar{\rho}_t(t)}_{\text{центр. мет.}} + \frac{\vec{v}}{V}\sum_{j=1}^{4}\underbrace{(\rho_j(t)\cdot\vec{n}_j)}_{\text{центр. грани / проекция}} S_j = 0$$



2) Ур. диффузии

$$\rho_t = k\rho_{xx}$$

$$\Delta x\, \bar{\rho}_t = k \int_{x_i}^{x_{i+1}} \rho_{xx}\, dx$$

$$\Delta x\, \vec{\rho}_t = k\left(\rho_{x,i} - \rho_{x,i+1}\right)$$

$$\Delta x\, \vec{\rho}_t = k\left(\rho_{i-1} - 2\rho_i + \rho_{i+1}\right)$$

$$\bar{\rho}_t = \frac{k}{V} \sum_{j=1}^{4} \left(\nabla \rho_j \cdot \vec{n}_j\right) S_j$$