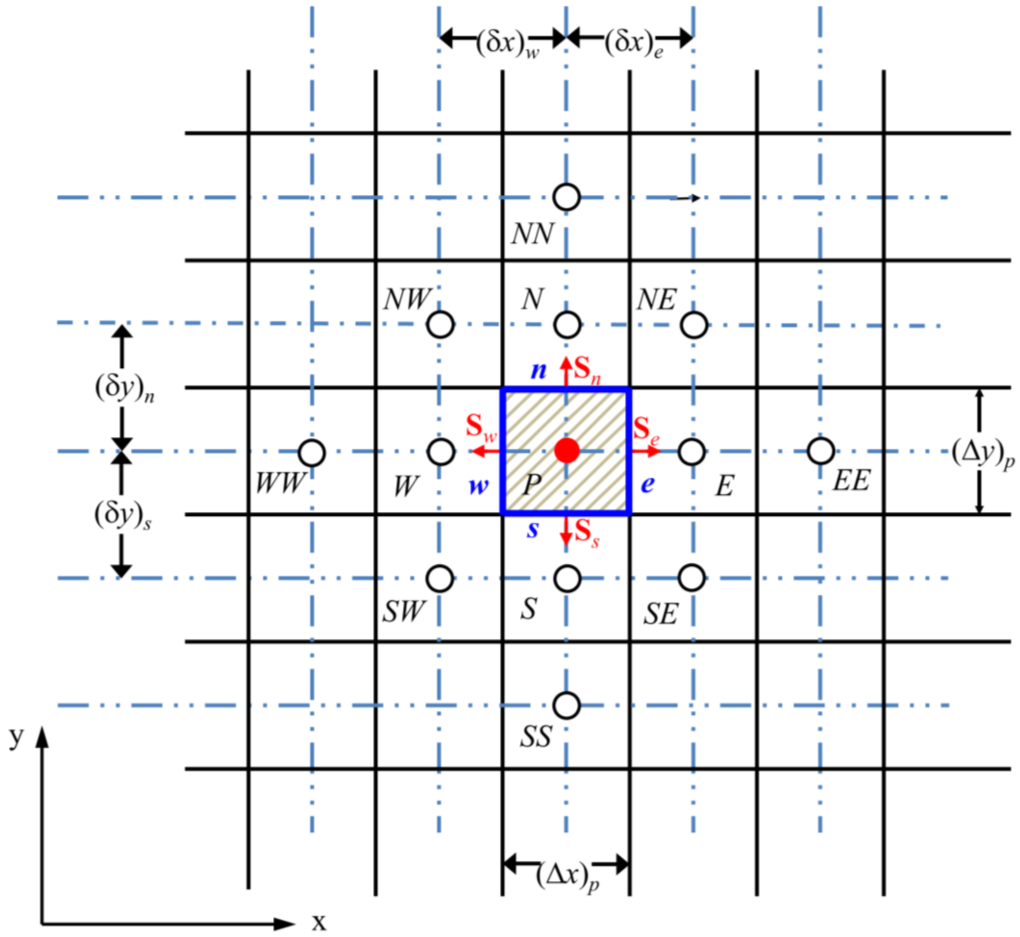

$\int_S \eta(\nabla\mathbf{u}^T)\cdot\mathbf{n}dS = \int_S \left(\eta\frac{\partial u_j}{\partial x_i}\boldsymbol{i}_i\boldsymbol{i}_j\right)\cdot(n_k\boldsymbol{i}_k)dS$

$$= \int_S \eta\frac{\partial u_j}{\partial x_i}n_k\boldsymbol{i}_i\boldsymbol{i}_j\boldsymbol{i}_k\,dS = \int_S \eta\frac{\partial u_j}{\partial x_i}n_k\boldsymbol{i}_i\delta_{jk}dS = \int_S \eta\frac{\partial u_j}{\partial x_i}n_j\boldsymbol{i}_i dS = \int_S \eta\left(\frac{\partial u_1}{\partial x_i}n_1 + \frac{\partial u_2}{\partial x_i}n_2\right)\boldsymbol{i}_i dS$$

当 i=1 时，即对应于 x 方向的动量方程时，同时在如上图所示结构化网格中离散，记$u_1 = u, u_2 = v$，上述方程可简化为：

$$= \int_S \left(\eta\frac{\partial u}{\partial x}n_1 + \eta\frac{\partial v}{\partial x}n_2\right)\mathbf{i}dS$$

$$= \left[\left(\eta\frac{\partial u}{\partial x}\right)_e S_e - \left(\eta\frac{\partial u}{\partial x}\right)_w S_w + \left(\eta\frac{\partial v}{\partial x}\right)_n S_n - \left(\eta\frac{\partial v}{\partial x}\right)_s S_s\right]\mathbf{i}$$

$$= \left[\eta_e S_e\frac{u_E - u_P}{(\delta x)_e} - \eta_w S_w\frac{u_P - u_W}{(\delta x)_w} + ? + ?\right]\mathbf{i}$$

后面两项我实在是不知道怎么离散，是

$$\eta_n S_n\left[\frac{\frac{v_{NE}+v_E}{2} - \frac{v_{NW}+v_W}{2}}{(\delta x)_w + (\delta x)_e}\right] - \eta_s S_s\left[\frac{\frac{v_{SE}+v_E}{2} - \frac{v_{SW}+v_W}{2}}{(\delta x)_w + (\delta x)_e}\right]$$

吗？我实在不敢确定，希望各位前辈指点一点

同理，i=2 时对应于 y 方向的动量方程：

$= \int_S \left(\eta\frac{\partial u}{\partial y}n_1 + \eta\frac{\partial v}{\partial y}n_2\right)\mathbf{j}dS$也同样存在相同的问题，求高人指点。