

$$\begin{cases} \frac{\partial V_x}{\partial t} - \frac{1}{\rho} \frac{\partial \sigma_{xx}}{\partial x} - \frac{1}{\rho} \frac{\partial \sigma_{xy}}{\partial y} = 0 \\ \frac{\partial V_y}{\partial t} - \frac{1}{\rho} \frac{\partial \sigma_{yx}}{\partial x} - \frac{1}{\rho} \frac{\partial \sigma_{yy}}{\partial y} = 0 \\ \frac{\partial \sigma_{xx}}{\partial t} - \lambda \left(\frac{\partial V_x}{\partial x} + \frac{\partial V_y}{\partial y} \right) - 2\mu \frac{\partial V_x}{\partial x} = 0 \\ \frac{\partial \sigma_{yy}}{\partial t} - \lambda \left(\frac{\partial V_x}{\partial x} + \frac{\partial V_y}{\partial y} \right) - 2\mu \frac{\partial V_y}{\partial y} = 0 \\ \frac{\partial \sigma_{xy}}{\partial t} - \mu \left(\frac{\partial V_x}{\partial y} + \frac{\partial V_y}{\partial x} \right) = 0 \end{cases}$$

$$\vec{q} = \begin{pmatrix} V_x \\ V_y \\ \sigma_{xx} \\ \sigma_{yy} \\ \sigma_{xy} \end{pmatrix}$$

$$\frac{\partial \vec{q}}{\partial t} + A_x \frac{\partial \vec{q}}{\partial x} + A_y \frac{\partial \vec{q}}{\partial y} = 0$$

$$A_x = \begin{pmatrix} 0 & 0 & -\frac{1}{\rho} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{1}{\rho} \\ -\lambda - 2\mu & 0 & 0 & 0 & 0 \\ -\lambda & 0 & 0 & 0 & 0 \\ 0 & -\mu & 0 & 0 & 0 \end{pmatrix}$$

$$A_y = \begin{pmatrix} 0 & 0 & 0 & 0 & -\frac{1}{\rho} \\ 0 & 0 & 0 & -\frac{1}{\rho} & 0 \\ 0 & -\lambda & 0 & 0 & 0 \\ 0 & -\lambda - 2\mu & 0 & 0 & 0 \\ -\mu & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\sigma_{xx} = \lambda(\epsilon_{xx} + \epsilon_{yy}) + 2\mu\epsilon_{xx}$$

$$\sigma_{yy} = \lambda(\epsilon_{xx} + \epsilon_{yy}) + 2\mu\epsilon_{yy}$$

$$\sigma_{xy} = 2\mu\epsilon_{xy}$$

$$\begin{pmatrix} \sigma_{xx} \\ \sigma_{yy} \\ \sigma_{xy} \end{pmatrix} = \begin{pmatrix} \lambda + 2\mu & \lambda & 0 \\ \lambda & \lambda + 2\mu & 0 \\ 0 & 0 & 2\mu \end{pmatrix}$$

$$\left. \begin{array}{l} \lambda + 2\mu = c_{11} = c_{33} \\ 2\mu = 2c_{44} \end{array} \right| \Rightarrow \lambda = c_{11} - 2c_{44}, \mu = c_{44}$$

$$A_x = \begin{pmatrix} 0 & 0 & -\frac{1}{\rho} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{1}{\rho} \\ -c_{11} & 0 & 0 & 0 & 0 \\ -c_{11} + 2c_{44} & 0 & 0 & 0 & 0 \\ 0 & -c_{44} & 0 & 0 & 0 \end{pmatrix}, \quad A_y = \begin{pmatrix} 0 & 0 & 0 & 0 & -\frac{1}{\rho} \\ 0 & 0 & 0 & -\frac{1}{\rho} & 0 \\ 0 & -c_{11} + 2c_{44} & 0 & 0 & 0 \\ 0 & -c_{11} & 0 & 0 & 0 \\ -c_{44} & 0 & 0 & 0 & 0 \end{pmatrix}$$