

$$Q = -C \left(\frac{dp}{dx} \right)^{4/7}$$

$$\frac{dp}{dx} = -C^{-7/4} Q^{7/4}$$

$$\frac{dp}{dx} = -C^{-7/4} Q \cdot |Q|^{3/4}$$

$$\frac{dQ}{dx} = -k(p - p_r)$$

$$\varnothing \in H_{div} ; \quad \psi \in L^2$$

$$\int \frac{dp}{dx} \varnothing dx = -C^{-7/4} \int Q |Q|^{3/4} \varnothing dx$$

$$\frac{d}{dx}(p \varnothing) = \frac{dp}{dx} \varnothing + p \frac{d\varnothing}{dx}$$

$$-\int p \frac{d\varnothing}{dx} dx + p \Big|_{\partial \Omega}^0 = -C^{-7/4} \int Q |Q|^{3/4} \varnothing dx$$

$$R_Q = C^{-7/4} \int Q |Q|^{3/4} \varnothing dx - \int p \frac{d\varnothing}{dx} dx$$

$$\int \frac{dQ}{dx} \psi dx = -k \int p \psi dx + k \int p_r \psi dx$$

$$R_p = -\int \frac{dQ}{dx} \psi dx - k \int p \psi dx + k \int p_r \psi dx$$

$$Q = \phi_i \alpha_i \quad P = \psi_i \beta_i$$

$$R_{Q_i} = C^{-7/4} \int Q |Q|^{3/4} \phi_i dx - \int P \frac{d\phi_i}{dx} dx$$

$$\frac{\partial R_{Q_i}}{\partial \alpha_j} = C^{-7/4} \int \left(\frac{dQ}{d\alpha_j} |Q|^{3/4} + Q \frac{3}{4} |Q|^{-1/4} \cdot \text{sign}(Q) \cdot \frac{dQ}{d\alpha_j} \right) \phi_i dx$$

$$\frac{\partial R_{Q_i}}{\partial \alpha_j} = C^{-7/4} \int \left(|Q|^{3/4} + \text{sign}(Q) \frac{3}{4} Q |Q|^{-1/4} \right) \phi_i \phi_j dx$$

$$\frac{\partial R_{Q_i}}{\partial \beta_j} = - \int \psi_j \frac{d\phi_i}{dx} dx$$

$$\frac{\partial R_{P_i}}{\partial \alpha_j} = - \int \frac{d\phi_j}{dx} \psi_i dx$$

$$\frac{\partial R_{P_i}}{\partial \beta_j} = -k \int \psi_j \psi_i dx$$