$$[I]\{\vec{p}^{\,n+1}\} - [J]\{\vec{p}^{\,n}\} + \eta[A]\{\vec{p}\} = \{\vec{p}_B\} \qquad \equiv [\text{psi}]$$

Multiply on left by $\frac{1}{\Delta t}[B]$

rate form

$$\frac{1}{\Delta t}[B]\{\vec{p}^{\,n+1}\} - \frac{1}{\Delta t}[B]\{\vec{p}^{\,n}\} + \underbrace{\frac{\eta}{\Delta t}[B][A]}_{[T]}\{\vec{p}\} = \underbrace{\frac{1}{\Delta t}[B]\{\vec{p}_B\}}_{Q} \equiv \left[\frac{ft^3}{day}\right]$$

$$B = \begin{bmatrix} \frac{V_0\phi c_t}{B_\alpha} & 0 & 0 & 0 & \cdots & 0 \\ \vdots & \frac{V_1\phi c_t}{B_\alpha} & & & & \vdots \\ \vdots & & \frac{V_2\phi c_t}{B_\alpha} & & & 0 \\ & & & & \ddots & \\ 0 & \cdots & & & 0 & \frac{V_{n-1}\phi c_t}{B_\alpha} \end{bmatrix} \qquad [T] = \begin{bmatrix} \cdots & & & & \\ -T & 2T & -T & 0 & \cdots \\ & -T & 2T & -T & \cdots \\ & & & \ddots & \\ & & & & \ddots \end{bmatrix}$$

"Accumulation"

$$V_i = A_i \Delta x \qquad T = \frac{kA_i}{\mu B_\alpha \Delta x}$$

"Transmissibility"

evaluate $\vec{p}$ @ $\vec{p}^n$

$$\boxed{\{\vec{p}^{n+1}\} = \{\vec{p}^n\} + \Delta t\,[B]^{-1}\left(\{\vec{Q}\} - [T]\{\vec{p}^n\}\right)}$$

Explicit

evaluate $\vec{p}$ @ $\vec{p}^{n+1}$

$$\boxed{\{\vec{p}^{n+1}\} = \left([T] + \frac{1}{\Delta t}[B]\right)^{-1}\left(\frac{1}{\Delta t}[B]\{\vec{p}^n\} + \{\vec{Q}\}\right)}$$

Implicit

Transmissibility Form