

INF5620

Project 1

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In this project we use the linear, two-dimensional wave equation:

$$\frac{\partial^2 u}{\partial t^2} + b \frac{\partial u}{\partial t} = \frac{\partial}{\partial x}(q(x, y)u(x, y, t)) + \frac{\partial}{\partial y}(q(x, y)u(x, y, t))$$

Our general scheme for internal points is:

$$\begin{aligned} u_i^{n+1} = & \frac{\frac{dt*b}{2} - 1}{\frac{dt*b}{2} + 1} u_{i,j}^{n-1} + \frac{2}{1 + K} u_{i,j}^n + \\ & 0.5 \left(\frac{\frac{dt^2}{dx^2}}{\frac{dt*b}{2} + 1} (q_{i+1,j} + q_{i,j})(u_{i+1,j}^n - u_i^n) - (q_{i,j} + q_{i-1,j})(u_{i,j}^n - u_{i-1,j}^n) \right) + \\ & 0.5 \left(\frac{\frac{dt^2}{dy^2}}{\frac{dt*b}{2} + 1} (q_{i,j+1} + q_j)(u_{i,j+1}^n - u_{i,j}^n) - (q_{i,j} + q_{i,j-1})(u_{i,j}^n - u_{i,j-1}^n) \right) + f_{i,j}^n \end{aligned}$$

I have chose