Brief Article

The Author

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1 First section

In one-dimension:

$$C_{i-\frac{1}{2}}\left(h_{i-1}^{t}+h_{i}^{t}\right)+C_{i+\frac{1}{2}}\left(h_{i+1}^{t}+h_{i}^{t}\right)+H_{i}\left(h_{b}^{t}-h_{i}^{t}\right)+\frac{S_{ijk}\Delta x\Delta y\Delta z}{\Delta t}\left(h_{i}^{t+1}-h_{i}^{t}\right)+w=0 \quad (1)$$

simplify equation 1 to:

$$h_{i}^{t}-h_{i}^{t+1}=\frac{\Delta t}{S_{ijk}\Delta x\Delta y\Delta z}\left[C_{i-\frac{1}{2}}\left(h_{i-1}^{t}+h_{i}^{t}\right)+C_{i+\frac{1}{2}}\left(h_{i+1}^{t}+h_{i}^{t}\right)+H_{i}\left(h_{b}^{t}-h_{i}^{t}\right)+w\right] \quad (2)$$

rearrange equation 2 to:

$$h_{i}^{t+1}=h_{i}^{t}-\frac{\Delta t}{S_{ijk}\Delta x\Delta y\Delta z}\left[C_{i-\frac{1}{2}}\left(h_{i-1}^{t}+h_{i}^{t}\right)+C_{i+\frac{1}{2}}\left(h_{i+1}^{t}+h_{i}^{t}\right)-H_{i}h_{i}^{t}+H_{i}h_{b}^{t}+w\right] \quad (3)$$

Adding known boundary terms:

$$r_{i}^{t}=H_{i}h_{b}^{t}+w \quad (4)$$

Equation 3 in matrix-vector form:

$$\mathbf{h}^{t+1}=\mathbf{h}^{t}-\frac{\Delta t}{\Delta x\Delta y\Delta z}\mathbf{S_{ijk}}\left[\left(\mathbf{C}-\mathbf{H}\right)\mathbf{h}^{t}+\mathbf{r}\right] \quad (5)$$

Subject to the stability constraint:

$$max\left(\frac{C_{ijk}\Delta t}{S_{ijk}\Delta x\Delta y\Delta z}\right)\leq 1 \quad (6)$$

rearrange equation 6 to determine the maximum stable time step length:

$$\Delta t_{max}=\frac{S_{ijk}\Delta x\Delta y\Delta z}{C_{ijk}} \quad (7)$$

1.1 A subsection

More text.