

## 1 F

$$F = 2 \frac{\partial}{\partial x} \left( \nu^* \frac{\partial u}{\partial x} \right) + \frac{\partial}{\partial y} \left( \nu^* \left( \frac{\partial u}{\partial y} + \frac{\partial v}{\partial x} \right) \right) + \frac{\partial}{\partial z} \left( \nu^* \left( \frac{\partial u}{\partial z} + \frac{\partial w}{\partial x} \right) \right) \quad (1)$$

$$F_{1i,j,k} = 2 \left( \nu_{i+1,j,k}^* \left( \frac{u_{i+1,j,k} - u_{i,j,k}}{\delta x^2} \right) - \nu_{i,j,k}^* \left( \frac{u_{i,j,k} - u_{i-1,j,k}}{\delta x^2} \right) \right) \quad (2)$$

$$F_{2i,j,k} = \frac{1}{\delta y} \left( \nu_{i+\frac{1}{2},j+\frac{1}{2},k}^* \left( \frac{u_{i,j+1,k} - u_{i,j,k}}{\delta y} + \frac{v_{i+1,j,k} - v_{i,j,k}}{\delta x} \right) - \nu_{i+\frac{1}{2},j-\frac{1}{2},k}^* \left( \frac{u_{i,j,k} - u_{i,j-1,k}}{\delta y} + \frac{v_{i+1,j-1,k} - v_{i,j-1,k}}{\delta x} \right) \right) \quad (3)$$

$$F_{3i,j,k} = \frac{1}{\delta z} \left( \nu_{i+\frac{1}{2},j,k+\frac{1}{2}}^* \left( \frac{u_{i,j,k+1} - u_{i,j,k}}{\delta z} + \frac{w_{i+1,j,k} - w_{i,j,k}}{\delta x} \right) - \nu_{i+\frac{1}{2},j,k-\frac{1}{2}}^* \left( \frac{u_{i,j,k} - u_{i,j,k-1}}{\delta z} + \frac{w_{i+1,j,k-1} - w_{i,j,k-1}}{\delta x} \right) \right) \quad (4)$$

## 2 G

$$G = \frac{\partial}{\partial x} \left( \nu^* \left( \frac{\partial v}{\partial x} + \frac{\partial u}{\partial y} \right) \right) + 2 \frac{\partial}{\partial y} \left( \nu^* \frac{\partial v}{\partial y} \right) + \frac{\partial}{\partial z} \left( \nu^* \left( \frac{\partial v}{\partial z} + \frac{\partial w}{\partial y} \right) \right) \quad (5)$$

$$G_{1i,j,k} = \frac{1}{\delta x} \left( \nu_{i+\frac{1}{2},j+\frac{1}{2},k}^* \left( \frac{u_{i,j+1,k} - u_{i,j,k}}{\delta y} + \frac{v_{i+1,j,k} - v_{i,j,k}}{\delta x} \right) - \nu_{i-\frac{1}{2},j+\frac{1}{2},k}^* \left( \frac{u_{i-1,j+1,k} - u_{i-1,j,k}}{\delta y} + \frac{v_{i,j,k} - v_{i-1,j,k}}{\delta x} \right) \right) \quad (6)$$

$$G_{2i,j,k} = 2 \left( \nu_{i,j+1,k}^* \left( \frac{v_{i,j+1,k} - v_{i,j,k}}{\delta y^2} \right) - \nu_{i,j,k}^* \left( \frac{v_{i,j,k} - v_{i,j-1,k}}{\delta y^2} \right) \right) \quad (7)$$

$$G_{3i,j,k} = \frac{1}{\delta z} \left( \nu_{i,j+\frac{1}{2},k+\frac{1}{2}}^* \left( \frac{v_{i,j,k+1} - v_{i,j,k}}{\delta z} + \frac{w_{i,j+1,k} - w_{i,j,k}}{\delta y} \right) - \nu_{i,j+\frac{1}{2},k-\frac{1}{2}}^* \left( \frac{v_{i,j,k} - v_{i,j,k-1}}{\delta z} + \frac{w_{i,j+1,k-1} - w_{i,j,k-1}}{\delta y} \right) \right) \quad (8)$$

### 3 H

$$H = \frac{\partial}{\partial x} \left( \nu^* \left( \frac{\partial w}{\partial x} + \frac{\partial u}{\partial z} \right) \right) + \frac{\partial}{\partial y} \left( \nu^* \left( \frac{\partial w}{\partial y} + \frac{\partial v}{\partial z} \right) \right) + 2 \frac{\partial}{\partial z} \left( \nu^* \frac{\partial w}{\partial z} \right) \quad (9)$$

$$H_{1i,j,k} = \frac{1}{\delta x} \left( \nu_{i+\frac{1}{2},j,k+\frac{1}{2}}^* \left( \frac{w_{i+1,j,k} - w_{i,j,k}}{\delta x} + \frac{u_{i,j,k+1} - u_{i,j,k}}{\delta z} \right) - \nu_{i-\frac{1}{2},j,k+\frac{1}{2}}^* \left( \frac{w_{i,j,k} - w_{i-1,j,k}}{\delta x} + \frac{u_{i-1,j,k+1} - u_{i-1,j,k}}{\delta z} \right) \right) \quad (10)$$

$$H_{2i,j,k} = \frac{1}{\delta y} \left( \nu_{i,j+\frac{1}{2},k+\frac{1}{2}}^* \left( \frac{w_{i,j+1,k} - w_{i,j,k}}{\delta y} + \frac{v_{i,j,k+1} - v_{i,j,k}}{\delta z} \right) - \nu_{i,j-\frac{1}{2},k+\frac{1}{2}}^* \left( \frac{w_{i,j,k} - w_{i,j-1,k}}{\delta y} + \frac{v_{i,j-1,k+1} - v_{i,j-1,k}}{\delta z} \right) \right) \quad (11)$$

$$H_{3i,j,k} = 2 \left( \nu_{i,j,k+1}^* \left( \frac{w_{i,j,k+1} - w_{i,j,k}}{\delta z^2} \right) - \nu_{i,j,k}^* \left( \frac{w_{i,j,k} - w_{i,j,k-1}}{\delta z^2} \right) \right) \quad (12)$$