

Corrigendum

In Chapter 2, Equations (2.3) and (2.4) should be

$$\partial_t U + (\nabla \cdot \mathbf{V}u) - \partial_x(p\phi_\eta) + \partial_\eta(p\phi_x) = F_U \quad (2.3)$$

$$\partial_t V + (\nabla \cdot \mathbf{V}v) - \partial_y(p\phi_\eta) + \partial_\eta(p\phi_y) = F_V \quad (2.4)$$

In Chapter 2, Governing Equations, the correct equation (2.33) should be:

$$F_{V_{cor}} = - \left(f + u \frac{\partial m}{\partial y} - v \frac{\partial m}{\partial x} \right) U + eW \sin \alpha_r - \frac{vW}{r_e} \quad (2.33)$$

In Chapter 3, Model Discretization, the coefficient C on page 12 should be defined as

$$C = c_s^2 / \mu^{t*} \alpha_d^{t*2}$$

The correct equation 3.11 is

$$\delta_\tau W'' - m^{-1} g \left[(\alpha/\alpha_d)^{t*} \left[\partial_\eta(C \partial_\eta \phi'') + \partial_\eta \left(\frac{c_s^2}{\alpha^{t*}} \frac{\Theta''}{\Theta^{t*}} \right) \right] - \mu_d'' \right]^\tau = R_W^{t*} \quad (3.11)$$

The correct equations (3.12) and (3.26) are:

$$\delta_\tau \phi'' + \frac{1}{\mu_d^{t*}} [m \Omega''^{\tau+\Delta\tau} \phi_\eta^{t*} - \overline{g W''^\tau}] = R_\phi^{t*} \quad (3.12)$$

$$\delta_\tau \phi'' + \frac{1}{\mu_d^{t*}} [m \Omega''^{\tau+\Delta\tau} \delta_\eta \phi^{t*} - \overline{g W''^\tau}] = R_\phi^{t*} \quad (3.26)$$

For equations (3.13), (3.14), (3.15), and (3.17), the correct ones are:

$$R_U^{t*} = -m[\partial_x(Uu) + \partial_y(Vu)] - \partial_\eta(\Omega u) - (\mu_d \alpha \partial_x p' - \mu_d \alpha' \partial_x \bar{p}) - (\alpha/\alpha_d)(\mu_d \partial_x \phi' - \partial_\eta p' \partial_x \phi + \mu_d' \partial_x \phi) + F_U \quad (3.13)$$

$$R_V^{t*} = -m[\partial_x(Uv) + \partial_y(Vv)] - \partial_\eta(\Omega v) - (\mu_d \alpha \partial_y p' - \mu_d \alpha' \partial_y \bar{p}) - (\alpha/\alpha_d)(\mu_d \partial_y \phi' - \partial_\eta p' \partial_y \phi + \mu_d' \partial_y \phi) + F_V \quad (3.14)$$

$$R_{\mu_d}^{t*} = -m^2[\partial_x U + \partial_y V] - m \partial_\eta \Omega \quad (3.15)$$

$$R_W^{t*} = -m[\partial_x(Uw) + \partial_y(Vw)] - \partial_\eta(\Omega w) + m^{-1} g(\alpha/\alpha_d)[\partial_\eta p' - \bar{\mu}_d(q_v + q_c + q_r)] - m^{-1} \mu_d' g + F_W \quad (3.17)$$

At the top of page 14 in Chapter 3, we have corrected the statement concerning the lower boundary condition for the vertically-implicit solution for W'' , the correct lower boundary condition being $\Omega = \Omega'' = 0$.

Also in Chapter 3, page 18, the correct equation for V component of the Coriolis and curvature term is

$$F_{V_{cor}} = -(\overline{f^y} + \overline{u^x \delta_y m} - \overline{v^y \delta_x m}) \overline{U^{xy}} + \overline{e^y W^{y\eta}} \overline{\sin \alpha_r^y} - \frac{v \overline{W^{y\eta}}}{r_e}$$

In Chapter 4, Turbulent Mixing and Model Filters, the term D in equation (4.6) has been corrected to:

$$D = \frac{1}{2} \left[D_{11}^2 + D_{22}^2 + D_{33}^2 \right] + (\overline{D_{12}^{xy}})^2 + (\overline{D_{13}^{x\eta}})^2 + (\overline{D_{23}^{y\eta}})^2$$