Instability in Geophysical Flows

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Errata

- Page 28, equations following (2.15) are missing a factor ν. They should read

$$\vec{\nabla}\cdot\frac{\partial\vec{u}'}{\partial t} \;=\; -\vec{\nabla}\cdot\vec{\nabla}\pi' + \vec{\nabla}\cdot(b'\hat{e}^{(z)}) + \nu\vec{\nabla}\cdot\nabla^2\vec{u}',$$

  or,

$$\frac{\partial}{\partial t}\underbrace{(\vec{\nabla}\cdot\vec{u}')}_{=0} \;=\; -\nabla^2\pi' + \frac{\partial b'}{\partial z} + \nu\nabla^2\underbrace{(\vec{\nabla}\cdot\vec{u}')}_{=0}.$$

- Page 46, reference following (2.61) is to Figure 2.10 (not 2.11).

- Page 70, first equation for $\vec{U}\cdot\underset{\sim}{A}$ should read

$$\vec{U}\cdot\underset{\sim}{A} \;=\; \begin{bmatrix} U_1A_{11} & U_1A_{12} & U_1A_{13} \\ U_2A_{21} & U_2A_{22} & U_2A_{23} \\ U_3A_{31} & U_3A_{32} & U_3A_{33} \end{bmatrix}.$$

- Page 100 on line preceding (3.86): reference is to Figure 3.21 (not 3.20).

- Page 118: The equation at the bottom of the page is missing a factor of 2. It should read

$$c = \pm\sqrt{\frac{\Delta b}{2k} - \frac{\Delta u^2}{4}},$$

  and the accompanying equation at the top of page 119 should therefore read

$$\sigma = \pm\sqrt{\frac{\Delta u^2}{4}k^2 - \frac{\Delta b}{2}k}\,.$$

  The nondimensional variables that follow can be redefined as

$$c^\star = \frac{c}{\Delta u}\;; \quad k^\star = k\frac{2\Delta u^2}{\Delta b}\;; \quad \sigma^\star \;=\; \frac{2\Delta u}{\Delta b}\sigma$$

  in which case the remaining expressions in the subsection are correct.

- Figure 4.8: The final sentence of the caption should read "The scaled wavenumber and growth rate are defined as $k^\star = 2k\Delta u^2/\Delta b$ and $\sigma^\star = 2\sigma\Delta u/\Delta b$, respectively."

- Page 158, line 3: "roundoff error" should read " truncation error".

- Page 174, equation (7.4) should read
$$\frac{Dw}{Dt} = -\frac{\partial \pi}{\partial r}$$

- Page 179, first unnumbered equation should read
$$\frac{\mathrm{d}\hat{\psi}}{\mathrm{d}r} = -\frac{\ell}{r}\hat{\psi}.$$

- Page 193, definition preceding (7.42) should read
$$\hat{u} = -\imath\, m\, \hat{\psi}(r)\ ; \quad \hat{w} = \frac{1}{r}\frac{d}{dr} r\hat{\psi}(r),$$
and (7.42) itself should read
$$\frac{d}{dr}\left[\frac{1}{r}\frac{d}{dr}(r\psi)\right] + \left[\frac{\Phi}{(W-c)^2} - \frac{Z}{W-c} - m^2\right]\ \hat{\psi}\ =\ 0,$$

- Page 243, last paragraph of 10.1.2, line 2: superflous word "that".

- Page 300, following first sentence, add: "If the fastest-growing mode is found at the limit $k \to \infty$, just use your largest value of k.

- Page 302: Exercise 18 should be accompanied by an extra copy of figure 8.6 for the student to draw on.

- Page 313: Project B.2 should include a numerical solution of (B.29).