Errata

Slingerland, R.L. and Kump, L., 2011. Mathematical Modelling of Earth's Dynamical Systems. Princeton University Press, Princeton, 231 pp.

Chapter 2

p. 38--Modeling Exercise 3, first line: Change “fully implicit” to “Crank-Nicolson”.

Chapter 3

p. 41--Equation 3.1 should read
D = kM

p. 45--just above equation 3.10, text should read:

“. . . canonical value of P = 2.45 . . .”

p. 45--Equation 3.11 should read

$P' = P + b\sin(\omega t)$

p. 45--Equation 3.13 should read

$$\frac{dM}{dt} = P + b\sin(\omega t) - kM$$

and in equation 3.12, all “primes” on P should be removed as well.

p. 46--middle of the page, the prime on P should be removed.

P. 57--on the line after Eq. 3.28, text should read:

“. . . (a rearrangement of the forward difference operator, equation 2.14), which can be . . .”

p. 69--Fig. 3.14 is missing the y axis. Should read “C reservoir size”

p. 70--middle of last paragraph, the parenthetical phrase should read:

“. . . “(e.g., $\varepsilon \vec{y}_n^1$, where ε is typically 0.001). . . “

and then later in the paragraph:

"... Divide the difference between the incremented derivatives and the original derivatives by $\varepsilon \vec{y}_n^1$. This gives you the first column in the Jacobian."

p. 73, Modeling Exercise 3, the second differential equation given should read:

$$\frac{dy_2}{dt} = -999y_1 - 1999y_2$$

Chapter 4

p. 76--first paragraph, we should have included an explicit treatment of porosity. Accordingly, the 9th line should read:

"... distance along the aquifer, *x* [m]; porosity, $\phi\,[\frac{\text{vol. of pore space}}{\text{vol. of aquifer}}]$; and time, *t* [s]... "

Then Equation 4.2 should be modified and additional text added after Equation 4.2:

$$\frac{\partial CAdx\phi}{\partial t} = qA\phi - \left(qA\phi + \frac{\partial qA\phi}{\partial x}dx\right) - SAdx\phi, \qquad (4.2)$$

where we are assuming that the cross-sectional area for diffusive flux is reduced proportionally to the porosity."

p. 79--the non-dimensional indicator * was not consistently applied to the appropriate variables. In the third paragraph:

"For the nondimensionalized diffusion problem described above, with the initial condition C* (0,x*) = 0 and boundary conditions C*(x*,0) = 1 and C*(x*,∞) = 0, the exact solution is ..."

p. 88—Modeling Exercise 1, sixth line: Change "α_b = 2 rad" to "α_b"

Chapter 5

p. 95—fourth sentence in section entitled **Check Units**: change "t* = tD/L" to "t* = tD/L^2"

Chapter 7

p.132—second line of Equation 7.2 should read: " $+q_p WY - \left[q_p WY + \frac{\partial q_p WY}{\partial x} dx \right] + SYWdx$ "

p. 145—Equation 7.22 should read: " $\frac{P_i^{n+1} - P_i^n}{\Delta t} = -u \frac{P_r^n - P_l^n}{\Delta x} + D \frac{P_{i-1}^n - 2P^n{}_i + P_{i+1}^n}{\Delta x^2}$ "

Chapter 8

p. 159—Equation 8.17 should read:

$$\overline{u_i^{n+1}} = u_i^n - \frac{\Delta t}{\Delta x}\left(E_{i+1}^n - E_i^n \right) + r(u_{i+1}^n - 2u_i^n + u_{i-1}^n)$$

where

$$r = \frac{\Delta t}{\Delta x^2}$$

p. 160—Equation 8.18 should read:

$$u_i^{n+1} = \frac{1}{2}[u_i^n + \overline{u_i^{n+1}} - \frac{\Delta t}{\Delta x}\left(\overline{E_i^{n+1}} - \overline{E_{i-1}^{n+1}} \right)$$

$$+r(\overline{u_{i+1}^{n+1}} - 2\overline{u_i^{n+1}} + \overline{u_{i-1}^{n+1}})]$$

Chapter 9

p. 186—Modeling Exercise 3, first hint should read: "The governing equations will be conservation of mass equation for the flow, a general law…etc."