Errata

Numerical Methods for Physics

Second Edition

Updated May 4, 2004

This errata lists corrections and clarifications for the first printing of the second edition. Some items are corrected in subsequent printings.

Corrections

Page 25: The sentence starting on the last line should read "Using `intrpf`, find the estimated ...".

Page 28: Second sentence of the second paragraph in the **Round-off Error** section should read "...the finite number of digits in the mantissa."

Page 44: Exercise 2.1 has only a part (a) and no part (b).

Page 65: In the C++ version of `pendul` replace

```
    ErrorBar += period[i]*period[i];
  }
  AvePeriod /= nPeriod;
```

with

```
  }
  AvePeriod /= nPeriod;
  for( i=1; i<=nPeriod; i++ ) {
    ErrorBar += (period[i] - AvePeriod)*(period[i] - AvePeriod);
  }
```

Page 76: Next to the last sentence should read "unspecified coefficients: α, β, w_1, and w_2."

Page 89: First sentence of the first paragraph should read "...a gravitational attraction due to all the planets."

Page 119: First sentence of the second paragraph should read "...defined as the inverse of the normalized ..."

Page 124: Equation (4.48) should read "$\mathbf{f}^{\mathrm{T}} = \ldots$" and should be followed by the phrase "where $\mathbf{f}^{\mathrm{T}}$ is the transpose of $\mathbf{f}$.

Page 125: Second full sentence after equation (4.49) should read "...for finding $\mathbf{x}^*$ using Newton's method."

Page 152: In Exercise 11, the fourth sentence should read "...maximum error, $\max(|Y(x_i) - y_i|)$, versus ..."

Page 153: In Exercise 12, the data is tabulated in Appendix 5C, not 5B.

Page 162: In Exercise 17, in all 4 parts the equation should read "$y_{j+1} =$" instead of "$y_j =$".

Page 165: The sentence after equation (5.64) should read: The complex constants, c_0, c_+, and c_-, are specified by the initial condition $\mathbf{x}(t = 0)$ and $d\mathbf{x}(t = 0)/dt$.

Page 179: The second line of **Listing 5B.3** should read:

```
double inv(Matrix a, Matrix& aInv);
```

Page 204: The phrase after equation (6.41) should read "and the a_j's are determined ...".

Page 210: The comment on the eighth line from the top should read `Reset density` rather than `Reset temperature`.

Page 237: The equations in Exercise 8 should not have equation numbers.

Page 238: The end of the second sentence in Exercise 12 should read "... and ρ_0 are constants."

Page 238: The equations in Exercise 13 should not have equation numbers.

Page 252: The end of the sentence following equation (8.17) should read "... that is, $\partial T/\partial t = 0$."

Page 283: The last sentence of the third paragraph should read "findings from Section 6.2."

Page 289: Equation (9.41) should read:

$$e^{-z} \approx \frac{1 - z/2}{1 + z/2}$$

Page 289: The last sentence in the paragraph below equation (9.41) should read "for the exponential, $1 - z$, $1/(1 + z)$, and $(1 - \frac{1}{2}z)/(1 + \frac{1}{2}z)$, only the Páde approximation retains this unitary property."

Page 293: In Exercise 14, the denominator of the last term should read

$$\sum_j (\psi_j^n)^* \psi_j^n$$

Page 299: In Exercise 21, the probability should be normalized so it should read

$$P(t_n) = \frac{\sum_{i=N/4}^{3N/4} (\psi_i^n)^* \psi_i^n}{\sum_{i=1}^{N} (\psi_i^n)^* \psi_i^n}$$

Page 316: In the third line of Table 10.4, the word "asymptotic" is misspelled.

Page 335: In listing 10A.3, line 9, the word "asymptotic" is misspelled in the comment.

Page 338: In listing 10B.3, line 13, the word "asymptotic" is misspelled in the comment.

Page 347: The sentence following equation (11.21) should end "is the probability density of $\Re$."

Page 355: In Exercise 11.14 the expressions in the last sentence should read $x = R\sqrt{\Re_1}\cos(2\pi\Re_2)$ and $y = R\sqrt{\Re_1}\sin(2\pi\Re_2)$.

Page 355: In Exercise 11.15 the equation should read

$$x = \sqrt{\frac{12}{M}} \sum_{i=1}^{M} (\Re_i - \frac{1}{2})$$

Page 359: Equation (11.49) should read:

$$M_{\mathrm{coll}} = \frac{1}{2}(N_{\mathrm{c}} - 1)N_{\mathrm{ef}} f \tau = \frac{N_{\mathrm{c}}(N_{\mathrm{c}} - 1)N_{\mathrm{ef}} \pi d^2 \langle v_{\mathrm{r}} \rangle \tau}{2V_{\mathrm{c}}}$$

Page 359: Equation (11.51) should read:

$$M_{\mathrm{cand}} = \frac{N_{\mathrm{c}}(N_{\mathrm{c}} - 1)N_{\mathrm{ef}} \pi d^2 v_{\mathrm{r}}^{\mathrm{max}} \tau}{2V_{\mathrm{c}}}$$

Page 359: The second sentence after equation (11.49) should read "... over all $\frac{1}{2}N_{\mathrm{c}}(N_{\mathrm{c}} - 1)$ pairs ..."

Page 372: In exercise 11.27, the phrase in the next to the last sentence should read "coefficient using (11.52)."

Page 378: Line 15 should read:

```
select = coeff*number*(number-1)*crmax(jcell) + selxtra(jcell);
```

Page 388: Line 2 should read:

```
double select = coeff*number*(number-1)*crmax(jcell) + selxtra(jcell);
```

Page 413: The solution of Exercise 7.11 should read: "For $\tau = 0.2$, $N = 80$, using Lax-Wendroff, density and r.m.s. amplitude are:"; note that the second plot is actually the square root of the power.

Page 417: In the solution for Exercise 11.21, $\Delta v = 100$ m/s.

Clarifications

In the MATLAB programs, the expression `flipud(rot90(A))` may be replaced with the simpler, equivalent expression `A.'`, that is, the transpose of matrix `A`.

Page 9: The function to graph in Exercise 1.3, part (c) is $f(x) = e^{-x} \sin^2 x$.

Page 38: The viscosity, nu, is the kinematic viscosity, which is related to the dynamic viscosity, η, as $\nu = \eta/\rho = \eta/nm$ (see pg. 367).

Page 168: In Figure 5.16 the peaks are expected at $f_0 = \sqrt{2}/2\pi \simeq 0.225$, $f_+ \simeq 0.294$, and $f_- \simeq 0.122$ since $f = \omega/2\pi$.

Pages 208–214: In the `dftcs` and `neutrn` programs, the diagnostic message regarding stability only applies to the FTCS scheme.

Page 270: The program `fftpoi` works better using `N = 64` grid points.

Page 296: In the Thomas algorithm the values of α are left unchanged in the matrix though it is understood that they are zero at the end of forward elimination.

Page 414: In the solution of Exercise 9.7 for $\tau > t_\sigma$, the expression for the one-norm can be simplified to

$$||\mathbf{A}||_1 = \begin{cases} 1 + \frac{\tau}{2t_\sigma} & \tau \leq \frac{4}{3}t_\sigma \\ \frac{2\tau}{t_\sigma} - 1 & \tau \geq \frac{4}{3}t_\sigma \end{cases}$$