Celestial Calculations: A Gentle Introduction to Computational Astronomy

Consolidated Errata

October 13, 2020

Thanks to all who have contributed to this errata list, especially John Pinto whose attention to detail is greatly appreciated. Just when you think you've found the last mistake...!

The author can be contacted at jllmitpress@gmail.com should additional errors be found in the book requiring this errata list to be updated.

Chapter 3: Time Conversions

- **Page 47, section 3.9, step 4**

  The parenthetical note is incorrect. It should read

  > "Note that adding 24^h means that the resulting LCT is for the *previous* day while subtracting 24^h means that the resulting LCT is for the *next* day."

- **Page 47, section 3.10**

  The following note should be inserted before the first paragraph.

  > "Note: The time conversion method presented in this section is accurate to approximately a tenth of a second."

- **Page 48, section 3.11**

  The following note should be inserted before the first paragraph.

  > "Note: The time conversion method presented in this section is accurate to approximately a tenth of a second."

Chapter 4: Orbits and Coordinate Systems

- **Page 85, section 4.6, second paragraph**

  The sentence "Right ascension is analogous to longitude ..." should note that right ascension is "... how far *east* an object is away from the First Point of Aries, ..."

- **Page 89, section 4.7, step 1**

  This step should read

  > 1. Convert the altitude h to decimal format.
  >
  > (Ans: $h = 40.0°$.)

- **Page 91, section 4.7, step 11**

  Step 11 of the example should read

  > 11. Convert A and h to DMS format.
  >
  > (Ans: $A = 80°31'31''$, $h = -20°34'40''$.)

- **Page 91, section 4.8**

  The last sentence on the page ("The ecliptic longitude is in the range $[0°, 360°]$ and measured along the ecliptic toward the First Point of Aries.") should be changed to "The ecliptic longitude is in the range $[0°, 360°]$ and is measured eastward along the ecliptic away from the First Point of Aries, which is in the same direction that the Sun moves along the ecliptic."

- **Page 94, section 4.8, equation 4.8.5**

  The "+" sign in the equation should be a "-" sign. That is, equation 4.8.5 should be

  $$\sin\beta = \sin\delta\cos\varepsilon - \cos\delta\sin\varepsilon\sin\alpha$$

  The book's programs that use this equation are implemented correctly.

- **Page 94, section 4.8, equation 4.8.6**

  The "-" sign in the equation should be a "+" sign. That is, equation 4.8.6 should be

  $$\tan\lambda = \frac{\sin\alpha\cos\varepsilon + \tan\delta\sin\varepsilon}{\cos\alpha}$$

  The book's programs that use this equation are implemented correctly.

- **Page 94, section 4.8, last paragraph, 2nd sentence**

  The sentence "They are identical when δ is interchanged with β and α is interchanged with λ" should read "They are identical when the + sign is interchanged with the – sign, δ is interchanged with β, and α is interchanged with λ"

- **Page 96, section 4.8, step 5**

  The plus sign in the equation to compute T should be a minus sign. The value computed ($T = 0.020943$) in this step is correct.

- **Page 96, section 4.8, step 7**

  The minus sign in the equation to compute y should be a plus sign. The value computed ($y = -0.080188$) in this step is correct.

- **Page 98, section 4.9, equation 4.9.2**

  This equation should be

  $$\alpha = \tan^{-1}\left[\frac{\cos b\cos(l - N_0)}{\sin b\cos\delta_0 - \cos b\sin\delta_0\sin(l - N_0)}\right] + \alpha_0$$

  The book's programs that use this equation are implemented correctly.

- **Page 98, section 4.9, equation 4.9.4**

  This equation should be

  $$l = \tan^{-1}\left[\frac{\sin\delta - \sin b\sin\delta_0}{\cos\delta\sin(\alpha - \alpha_0)\cos\delta_0}\right] + N_0$$

  The book's programs that use this equation are implemented correctly.

- **Page 99, section 4.9, step 2**

  This step should read

  > 2. Convert l_{1950} to decimal format.
  >
  > (Ans: $l = 180.0°$.)

- **Page 99, section 4.9, step 3**

  This step should state that $\delta_0 = 27.4°$ is the declination of the Galactic North Pole rather than the right ascension.

- **Page 99, section 4.9, step 8**

  This step should state that α_0 (instead of N_0) must be added to get the right ascension in degrees. The computed value of $\alpha_{deg} = 513.180867°$ in this example is correct.

- **Page 103, section 4.10, 3rd paragraph**

  The sentence "This algorithm does not work for declinations that are near $\pm 90°$." should be added immediately after the sentence in this paragraph that begins with "However, we will present an algorithm only for precession ..."

- **Page 104, section 4.10, equation 4.10.2**

  The sentence fragment following equation 4.10.2 should read "where D is the difference in years between the new epoch and the reference epoch."