Engineering Dynamics: A Comprehensive Introduction—Errata in Second Printing

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Last updated February 16, 2022

PRINCETON UNIVERSITY PRESS
PRINCETON AND OXFORD

Chapter 2:

i) In problem 2.11, the forces described in the hint should not be bold.

ii) In problem 2.16, the problem statement should be changed to add the assumption that the rock is released from rest. The phrase 'without the use of a computer' should be interpreted as 'without the use of numerical integration.'

Chapter 3:

i) In the caption of Figure 3.32 on page 97, the units of μ should be m^{-1} (two times).

ii) On page 99, after equation (3.77), should read $\dot{\theta}_0 = 0.01$ rad/s (not m/s).

iii) In Problem 3.28, assume (at the instant shown) the rocket's velocity is aligned with the thrust vector.

Chapter 4:

i) In Problem 4.5, the groove is semi-circular when viewed from above. Also, ignore the coefficient of friction corresponding to the horizontal component of the normal force required to make the puck travel around the groove: i.e., assume the only source of friction arises from the vertical component of the normal force.

ii) In Problem 4.13, for clarity, the problem statement, and part (a), should both say 'linear impulse'.

Chapter 5:

i) On page 169, Section 5.5, the boxed equation in Definition 5.8 should have a triangle over the equal since since it is a definition.

Chapter 6:

i) On page 193, the first line after Equation (6.7), the right-side of the inline equation should use $\mathbf{F}_{j,i}$ not $\overline{\mathbf{F}}_{j,i}$.

ii) On page 196, the final line of text before Equation 6.14 is incorrect. It should say: "A consequence of this definition is that the sum of the mass-weighted positions of all of the particles in the collection relative to the center of mass is zero."

iii) The first equation in Example 6.7 (page 202) is missing the total mass term (m_G). It should read:

$$m_G \frac{{}^{\mathcal{I}}d^2}{dt^2} \mathbf{r}_{G/O} = \mathbf{F}_G^{(ext)}$$

iv) In Problem 6.15 on p. 242, the given values for parameters x_0 and l_0 do not match the problem description (that initially the springs are compressed). If the are reversed, so that $x_0 = 5$m and $l_0 = 10$m the problem is much more physical, although the solution remains unchanged.

Chapter 7:

i) In Example 7.1 on pp. 249-250, both the figure (in terms of the placement of the center of mass) and the final equation of motion are only correct if we assume $m_P = m_Q$. In the case where they are unequal, the equation of motion becomes:

$$\ddot{\theta} = \frac{g}{l\left(m_P + m_Q\right)}\left(m_P \cos\left(\theta + \frac{\pi}{3}\right) - m_Q \sin\left(\theta + \frac{\pi}{6}\right)\right)$$

Chapter 8:

i) **Original Kindle Edition Only** Problem 8.1(a), ${}^{\mathcal{I}}\mathbf{v}_{P/O'}$ should be ${}^{\mathcal{I}}\mathbf{v}_{P/O}$.

ii) p. 331, Problem 8.4, the solution will include v_0 also.

Chapter 9:

i) On page 352, the second line should read, "its signed magnitude h_G, which can be positive or negative depending on the sign of the angular velocity. We do so..."

Chapter 11:

i) On p. 488, Example 11.9 - while there is no explicit error in this example, it should be pointed out that the constant of motion defined by Eqs. 11.31 and 11.33 can only be constant if Ω is *not* assumed to be constant (this is not a stated assumption in the example, but is one that students may tend to make based on previous examples in the chapter). So, if integrating the equations of motion give by 11.30 and 11.32, and treating Ω as constant, you will get a slightly incorrect motion, and the constant will not be conserved. In order to conserve the constant, you must integrate the complete system, including the expression for $\dot{\Omega}$ that can be derived from 11.31:

$$\dot{\Omega} = -\ddot{\psi}\sin\left(\theta\right) - \dot{\psi}\dot{\theta}\cos\left(\theta\right)$$

There also exists a second constant of motion, obtained by considering the same angular momentum balance, but using $\mathcal{I}$ frame components, in which case a zero exists in the right-hand side in the $\mathbf{e}_3$ component, and the quantity:

$$I_1\dot{\psi}\cos^2(\theta) + I_2\left(\Omega + \dot{\psi}\sin(\theta)\right)\sin(\theta)$$

can be shown to be conserved. Just as for the original constant, this quantity is also only conserved when Ω is allowed to vary.

ii) On p. 497, Eq. (11.54) contains an error. The equation is for rotation about a point Q, and so the moment term on the right-hand side should be about Q: $[\mathbf{M}_Q]_{\mathcal{B}}$.

iii) On p. 502, Example 11.13, just as with the comment above for Example 11.9, the constant of motion in Eq. 11.63 will only be constant if h is allowed to be time-varying, and if the numerical integration includes a term for $\dot{h}$ derived from this equation.

iv) On page 516, in the first line below the two unnumbered equations below Equation (11.80), the first inline equation should be $\omega_1(t_0) = -\omega_0$.

v) On page 516, in Equation (11.81), the first term should be negative and the second term positive, so it reads

$${}^{\mathcal{I}}\mathbf{h}_G = -I_O\omega_0\cos\omega_n t\mathbf{b}_1 + I_O\omega_0\sin\omega_n t\mathbf{b}_2 + J\omega_s\mathbf{b}_3$$

vi) On page 517, the paragraph after Eq. 11.86. ${}^{\mathcal{I}}\mathbf{h}_G = h_G\mathbf{e}_3$, not $\mathbb{I}_G\mathbf{e}_3$.

vii) On page 518, in the first line below the third unnumbered equation, the inline equation should be $\dot{\psi} = h_G/I_O$.

viii) On p. 530, in Problem 11.13(d), the given spring constant results in physically non-intuitive and non-illustrative system motion. A stiffer spring (at least 10 N/m) produces much better results.

ix) On p. 533, in Problem 11.19, the initial condition for ω_2 should be given as $\omega_2(0) = 2$ rad/s.

Appendix B:

i) On p. 642ff., the operators called "scalar tensor triple products" ($\mathbf{a}\cdot(\mathbf{b}\otimes\mathbf{c})$ and $(\mathbf{a}\otimes\mathbf{b})\cdot\mathbf{c}$) are more commonly known as the left and right dot products (or vector dyadic dot products).

ii) On p. 644, $[\mathbf{a}\cdot\mathbb{T}]_{\mathcal{I}}$ is given as $[\mathbf{a}]_{\mathcal{I}}^T[\mathbb{T}]_{\mathcal{I}}$, which would result in a row matrix. In order to ensure that the output is a column matrix, the whole expression must be transposed. The equation should read:

$$[\mathbf{a}\cdot\mathbb{T}]_{\mathcal{I}} = \left([\mathbf{a}]_{\mathcal{I}}^T[\mathbb{T}]_{\mathcal{I}}\right)^T = [\mathbb{T}]_{\mathcal{I}}^T[\mathbf{a}]_{\mathcal{I}}$$

iii) On p. 644, final equation, $[\mathbb{T} \times \mathbf{a}]_{\mathcal{I}}$ is given as $-[\mathbb{T}]_{\mathcal{I}}[\mathbf{a}\times]_{\mathcal{I}}$, but the negative sign is is incorrect. The expression should read:

$$[\mathbb{T} \times \mathbf{a}]_{\mathcal{I}} = [\mathbb{T}]_{\mathcal{I}}[\mathbf{a}\times]_{\mathcal{I}}$$