

Errata

Review of Attitude Representations Used for Aircraft Kinematics

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TYPESETTING errors occur in Eqs. (1), (2), (3), (4), (24), (25), (34), (41), (46), (49), (50), (52), (100), and (104). For the correct version of these equations see Phillips, Hailey, and Gebert.^{1,2} Specifically, the errors that have been identified are:

1. The left-hand side of the second line of Eq. (1) should be

$$\times \begin{Bmatrix} v_x \\ v_y \\ v_z \end{Bmatrix} = \text{rather than} \begin{Bmatrix} v_x \\ v_y \\ v_z \end{Bmatrix} =.$$

2. The term in the second row and the second column of the matrix on the right-hand side of Eq. (1) should be $S_\phi S_\theta S_\psi + C_\phi C_\psi$ rather than $S_\phi S_\theta C_\psi + C_\phi C_\psi$.

3. The term in the second row and the second column of the matrix on the right-hand side of Eq. (2) should be $S_\phi S_\theta S_\psi + C_\phi C_\psi$ rather than $S_\phi S_\theta C_\psi + C_\phi C_\psi$.

4. The term in the second row and the second column of the matrix on the right-hand side of Eq. (3) should be $S_\phi S_\theta S_\psi + C_\phi C_\psi$ rather than $S_\phi S_\theta C_\psi + C_\phi C_\psi$.

5. The term in the second row and the second column of the matrix on the right-hand side of Eq. (4) should be $S_\phi S_\theta S_\psi + C_\phi C_\psi$ rather than $S_\phi S_\theta C_\psi + C_\phi C_\psi$.

6. The term in the second row and the third column of the matrix on the right-hand side of Eq. (24) should be $E_{yz} + 2E_x SC$ rather than $E_{yz} - 2E_x SC$.

7. The term in the first row and the third column of the matrix on the right-hand side of Eq. (25) should be $2(e_x e_z - e_y e_0)$ rather than $2(e_x e_z + e_y e_0)$.

8. The term in the third row and the first column of the matrix on the right-hand side of Eq. (25) should be $2(e_x e_z + e_y e_0)$ rather than $2(e_x e_z - e_y e_0)$.

9. The third definition in the third line of Eq. (34) should be $\vec{i}_z \otimes \vec{i}_z \equiv -1$ rather than $\vec{i}_y \otimes \vec{i}_z \equiv -1$.

10. The y-component of the quaternion on the right-hand side of Eq. (41) should be $(-v_x e_z + v_y e_0 + v_z e_x)$ rather than $(-v_x e_z + v_y e_0 + v_z e_z)$.

11. The z-component of the quaternion on the right-hand side of Eq. (41) should be $(v_x e_y - v_y e_x + v_z e_0)$ rather than $(v_x e_y + v_y e_x + v_z e_0)$.

12. The term in the second row and the second column of the matrix on the right-hand side of Eq. (46) should be $S_\phi S_\theta S_\psi + C_\phi C_\psi$ rather than $S_\phi S_\theta C_\psi + C_\phi C_\psi$.

13. The last component on the right-hand side of Eq. (49) should be $(S_{\phi/2} S_{\theta/2} C_{\psi/2} - C_{\phi/2} C_{\theta/2} S_{\psi/2})^2$ rather than $(S_{\phi/2} S_{\theta/2} C_{\psi/2} + C_{\phi/2} C_{\theta/2} S_{\psi/2})^2$.

14. The first component on the right-hand side of Eq. (50) should be $C_\theta S_\psi$ rather than $C_\theta C_\psi$.

15. The second component on the right-hand side of Eq. (50) should be $S_\phi S_\theta C_\psi - C_\phi S_\psi$ rather than $S_\phi S_\theta S_\psi - C_\phi S_\psi$.

16. The last component on the left-hand side of Eq. (52) should be $s_y s_z (-S_\phi C_\theta - C_\phi S_\theta S_\psi + S_\phi C_\psi)$ rather than $s_y s_z (-S_\phi C_\theta + C_\phi S_\theta S_\psi + S_\phi C_\psi)$.

17. The last term in the brackets in the last line on the right-hand side of Eq. (100) should be $[\ddot{M}]_i e_i (t - t_i)^3$ rather than $[\dot{M}]_i e_i (t - t_i)^3$.

18. The last term in the second line of Eq. (104) should be $[(2/\omega_i) \sin(\omega_i \delta t/2)]$ rather than $[(2/\omega_1) \sin(\omega_i \delta t/2)]$.

References

- ¹Phillips, W. F., Hailey, C. E., and Gebert, G. A., "A Review of Attitude Kinematics for Aircraft Flight Simulation," AIAA 2000-4302, Aug. 2000.
- ²Phillips, W. F., Hailey, C. E., and Gebert, G. A., "The Effects of Orthogonality Error in Aircraft Flight Simulation," AIAA-2001-0108, Jan. 2001.

Wake Forces Implied in the Theodorsen and Goldstein Theories of Propellers

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THE title of the reference should be revised by the addition of the adjective "Spurious" so that it reads "Spurious Wake Forces Implied in the Theodorsen and Goldstein Theories of Propellers." It is belatedly realized that the present title, abstract, and early portion of the text are ambiguous in the meaning of the word "correction." It is well down on the second page before the clarification: "The thrust on the wake extension is thus a *false* contribution" (italics added). Then, at the top of p. 31, "Indeed, one can model the propeller as having a rigid helicoidal extension. . . . The propeller plus rigid

helicoidal extension is clearly an artifice." Thus the "corrections" subtract the spurious contribution of the implied (but nonexistent) rigid wake from the thrust and torque calculated via the cited theories. This is made explicit in Eq. (19).

Reference

- Ribner, H. S., "Wake Forces Implied in the Theodorsen and Goldstein Theories of Propellers," *Journal of Aircraft*, Vol. 35, No. 6, 1998, pp. 930–935.