If $k_1 \to \infty$ (or $\Omega_2/\Omega_1 \to 0$), the three-parameter material damper will become the Kelvin material damper. In such case, $\Omega_g \to \Omega_2$ and then $\Omega_2 \Omega_n \to \Omega_{pn}$. Hence, Eq. (11) will become $\tau_c = 2/\xi\Omega_{pn}$, which is exactly the time constant for the Kelvin material damper. If k_1 is finite, then $\Omega_g \neq \Omega_2$. Using $\Omega_g = \Omega_d$ and $\Omega_{pn} = \Omega_g \Omega_n$, the time constant becomes

$$\tau_c = 2/\xi\Omega_{pn}\left[\sqrt{1+(\Omega_2/\Omega_1)^2}\right]^3$$

This is always bigger than that of the Kelvin material damper given by Eq. (6a)

Conclusions

An approximate analytical expression for the decay time constant of the coning motion has been obtained by using perturbation techniques. The time constant is a concave function of the damping ratio and reaches the minimum at resonance. An interesting observation is that the time constant of the Kelvin material damper is always less than that of the three-parameter material damper irrespective of the magnitude of the material constants in the constitutive equations.

References

[1]Voigt, A. A., "Optical Scanning Apparatus with Two Mirrors Rotatable about a Common Axis," U.S. Patent, No. 4039246, Aug. 2, 1977.

[2]Miles, J. W., "On the Annular Damper for a Freely Precessing Gyroscope—II," *Journal of Applied Mechanics,* Vol. 30, No. 2, June 1963, pp. 189–192.

[3]Martin, F. F., "An Antitank Missile Seeker Employing an Infrared Schottky Barrier Focal Plane Array," *SPIE'S Infrared Technology for Target Detection and Classification,* Vol. 302, 1981, pp. 158–170.

[4]Chang, C. O., and Chen, M. P., "Analysis of an Elastomer Damper for a Freely Precessing Dual-Spin Seeker," NSC 78-0401-E002-26, Taipei, Republic of China, Jan. 1990.

Errata

Explicit Generalization of Lagrange's Equations for Hybrid Coordinate Dynamical Systems

Sangchul Lee and John L. Junkins
Texas A&M University, College Station, Texas 77843

[J. Guidance 15(6), pp. 1443–1452 (1992)]

THREE equations in this paper were typeset incorrectly. The AIAA Editorial Staff regrets this error and any inconvenience it has caused our readers. The correct equations appear below.

In the second column of page 1449, the first equation should read

$$2T = \sum_{i=1}^{4} \int_{l_{0_i}}^{l_i} \rho_i \dot{\underline{R}}_i \cdot \dot{\underline{R}}_i \, dx_i + I_h \dot{\theta}^2 + m_2 \dot{\underline{R}}_5 \cdot \dot{\underline{R}}_5 + m_3 \dot{\underline{R}}_6 \cdot \dot{\underline{R}}_6$$

The first equation on page 1450 should read

$$\begin{aligned}\underline{R}_3 = {} & [l_1 - l_2 \sin\alpha - w_2(l_2)\cos\alpha + x_3 \sin(\alpha+\beta) \\ & - w_3\cos(\alpha+\beta)]\,\hat{b}_1 + [w_1(l_1) + l_2\cos\alpha - w_2(l_2)\sin\alpha \\ & - x_3\cos(\alpha+\beta) - w_3\sin(\alpha+\beta)]\hat{b}_2\end{aligned}$$

On pages 1450–1451 the $\alpha \equiv (\partial w_1/\partial x_1)|_{l_1}$ should read

$$\begin{aligned}& \int_{l_{0_2}}^{l_2} \rho_2\left[\frac{d}{dt}(v_2^1 A_2^3 + v_2^2 B_2^3) - v_2^1 A_2^4 - v_2^2 B_2^4\right] dx_2 \\ & + \int_{l_{0_3}}^{l_3} \rho_3\left[\frac{d}{dt}(v_3^1 A_3^3 + v_3^2 B_3^3) - v_3^1 A_3^4 - v_3^2 B_3^4\right] dx_3 \\ & + \int_{l_{0_4}}^{l_4} \rho_4\left[\frac{d}{dt}(v_4^1 A_4^3 + v_4^2 B_4^3) - v_4^1 A_4^4 - v_4^2 B_4^4\right] dx_4 \\ & + m_3\left[\frac{d}{dt}(v_6^1 A_6^3 + v_6^2 B_6^3) - v_6^1 A_6^4 - v_6^2 B_6^4\right] \\ & = -E_1 I_1 \left.\frac{\partial^2 w_1}{\partial x_1^2}\right|_{l_1} + u_2 + u_3\end{aligned}$$