Ref. 3. The agreement is excellent. Similar agreement has been found for both minimum and maximum atomic oxygen densities. Hence, this technique relates Kapton ground data to space-flight results.

This analysis can be extended to other materials. If the reaction efficiency is known, then the constant K would be equal to the reaction efficiency times the material density. This approach assumes that the energy dependence remains at 0.6 power. This was done for Teflon, and the results compared with those given in Ref. 3 (see Fig. 4). The Teflon reaction efficiency used in this comparison is 1.08×10^{-25} cm^3/atom. The agreement is still good.

If there were a new material for which atomic oxygen surface erosion rate in space was desired, then it could be obtained from ground tests using this technique. The mass loss would have to be obtained at any two different energies so that a curve similar to Fig. 1 could be obtained. The technique from then on is straightforward.

Concluding Remarks

A technique has been developed that allows the computation of material losses due to atomic oxygen erosion of surfaces on an inertially stabilized spacecraft in a low Earth orbit from ground-based test results. The computations have been compared to the results of Shuttle tests, and the agreement is excellent for Kapton and Teflon. The technique can be applied to gravity-gradient stabilized spacecraft. The advantage of using this approach is that it allows ground-test data to be used to predict surface erosion of newly developed materials and coatings. This alleviates the need for separate space-flight testing of all materials and coatings to qualify them for low Earth orbit operations.

Acknowledgment

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Errata

Optimum Heat Rejection Temperatures for Spacecraft Heat Pumps

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[JSR 26, pp. 303-307 (1989)]

ON page 305, the fourth sentence under the heading "Constant ϕ_E, ϕ_R HDHP" was printed incorrectly in the published paper, distorting the authors' intended meaning. The sentence should appear as follows (changes have been italicized):

"The lift rises to 280 K, *the drop rises to 320 K*, and M/M_S rises to 0.80."

Closed-Form Approach to Rocket-Vehicles Aeroelastic Divergence

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[JSR 26, pp. 95-102 (1989)]

A NUMBER of errors were inadvertently introduced during production of this paper. We apologize for any inconvenience caused to the author or the readers.

Page 97:

The plus sign in Eq. (3) was omitted in the published paper; the equation should appear as follows:

$$\begin{Bmatrix} L_N \\ L_T \end{Bmatrix} = QS_r \begin{bmatrix} C_{L_{\alpha N}} & 0 \\ 0 & C_{L_{\alpha T}} \end{bmatrix} \left(\begin{bmatrix} 1 & -l_N \\ 1 & l_T \end{bmatrix} \begin{Bmatrix} \alpha \\ \dot{\theta}/U \end{Bmatrix} + \begin{Bmatrix} \phi_N \\ \phi_T \end{Bmatrix} \right) \tag{3}$$

In Eq. (7d), "(rigid static margin)" is the meaning of the quantity h_0.

Eq. (7i) is the equation above the line (7i), which merely contains an explanation of $(EI)_r$.

In Eq. (7k), the matrices on both sides are square; no multiplication takes place between indexed quantities.

In the second line of Eq. (8), all lambdas should be replaced by gammas, as shown here.

$$2\mu\left(\frac{1}{c_N c_T C_{L_\alpha}}\begin{bmatrix} r_0^2 & h_0 \\ h_0 & 1 \end{bmatrix}\begin{bmatrix} 1 & 0 \\ 0 & j_0^2 \end{bmatrix} - q\begin{bmatrix} \lambda_T & \lambda_N \\ 1 & -1 \end{bmatrix} \times \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix}\right)\begin{Bmatrix} \gamma^* \\ \theta^{**} \end{Bmatrix} + \begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}\begin{Bmatrix} \alpha \\ \theta^* \end{Bmatrix} = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix} \tag{8}$$

Page 98:

A gamma should replace the lambda that was printed in the line above Eq. (9).

The $-s$ in the third column of Eq. (1) should appear as s, as shown here.

$$\begin{bmatrix} A_{11} & sA_{12} & -1 \\ 1+A_{21} & sA_{22} & s \\ 1 & -1 & s \end{bmatrix}\begin{Bmatrix} \bar{\eta}(s) \\ \bar{\chi}(s) \\ \bar{\alpha}(s) \end{Bmatrix} = \begin{Bmatrix} 0 \\ 0 \\ 0 \end{Bmatrix} \tag{13}$$

Page 99:

In the line above Eq. (22), the closing parenthesis for (U/l) was mistakenly printed as a comma.

In the line below Eq. (25h), the statement "$w(x)$ consists of mode 1 only" is a major result of the steady-state motion analysis, and should have appeared as a separate line, (25i).

Page 100:

Equation (31) should be

$$\sigma^4 = \frac{180}{l_e^4 C_{L_\alpha}}\int_0^{l_e} (x - x_N)^2 \cdot (x - x_T)^2 C_{L_\alpha}(x)\,\mathrm{d}x \tag{31}$$

The first half of Table 1, and Tables 2 and 3, should appear as shown, with the corrected numbers printed in bold-face type.

Table 1 Vehicle A (upper) and vehicle B (lower) distributed properties[a]

Station, m	Flexural beam stiffness, EI, 10^6 N · m²	Mass per unit length, kg/m	c_{l_α},[b] m⁻¹
0.0	1.0	30	0.000
0.4	1.0, 0, 1.5	30, 60	—
0.5	—	60, 14	—
2.7	—	14, 62	—
2.8	1.5, 0, 0.4	62, 20	**0.127**
2.9	—	20, 30	—
3.4	—	—	0.573
3.9	—	30, 20	2.165
4.0	0.4, 0, 0.2	—	3.820
4.1	—	20, 10	—
5.0	0.2	10	0.000

Table 2 Vehicle A (upper) and vehicle B (lower) concentrated quantities

Station, m	Quantity	Value
0.0 0.4	Concentrated lift-slope coefficients[a]	1.910
0.4 2.8 4.0	Structural joints stiffnesses	0.6×10^6 N · m/rad
0.0 0.4	Concentrated lift-slope coefficients[a]	1.910
0.4 2.8 **4.5**	Structural joints stiffnesses	0.60×10^6 N · m/rad 0.18×10^6 N · m/rad 0.30×10^6 N · m/rad

[a]Referred to S_r.

Table 3 Selected parameters calculated for vehicles A and B

Parameter	Vehicle A	Vehicle B
m	100.0 Kg	85.00 Kg
x_{cg}[a]	2.361 m	2.152 m
j_0^2	0.1313	0.1342
l	3.894 m	3.862 m
λ_N	0.4536	0.5288
λ_T	0.5464	0.4712
C_{L_α}	7.101	6.953
c_N	0.4374	0.3560
c_T	0.5626	0.6440
h_0	0.1090	0.1153
r_0^2	0.2580	0.2425
γ_{11}	2.357×10^{-2}	2.991×10^{-2}
γ_{21}	-1.486×10^{-2}	-1.583×10^{-2}
γ_{12}	-2.351×10^{-4}	$\mathbf{2.423 \times 10^{-3}}$
γ_{22}	4.148×10^{-4}	-1.243×10^{-3}
μ	667.3	571.9
S_r	3.142×10^{-2} m²	3.142×10^{-2} m²
$(EL)_r$	3.333×10^5 N · m²	1.926×10^5 N · m²

[a]Measured from extreme aft.

Page 101:

The bottom half of Table 4 should appear as shown, with the corrected number printed in bold-face type.

B (I) Present method	1.600	1.581	1.579	1.727	0.6110	1.116	0.8634	5.169
(II) Ref. 9, converted	1.579	1.561[a]	1.559	1.700	0.6179[a]	1.083[a]	0.8504	5.168
(III) Pure Ref. 9	1.811	1.791[a]	1.788	1.755	0.5787[a]	1.176[a]	0.8775	5.253
Assump. 4 error, I:II, %	1.3	1.3	1.3	1.6	−1.1	3.0	1.5	0.0
Total error, I:III, %	−11.7	−11.7	−11.7	−1.6	5.6	−5.1	**−1.6**	−1.6

[a]The method of Ref. 9 does not yield q_h directly. The values appearing here were obtained as $\lim_{\mu\to\infty} q_{\text{div}}$. [b]$\omega_{1/2}$ = Nondimensional short-period frequency for $q/q_{\text{div}} = 1/2$