Table 3 Initial, perturbed, and corrected parameter values

Sl. No.	Details	True value	Perturbed value	Difference, %	Uncertainty, %	Corrected value	Corrected value[a]
1.	ϵ_1[b]	0.8	0.75	−6.25		0.818	0.793
2.	ϵ_3	0.819	0.85	3.79	±10.0	0.803	0.803
3.	ϵ_{12}	0.7	0.67	−4.29		0.698	0.705
4.	A_4	2733	2800	2.45		2818.0	2722.4
5.	A_5	570	555	−2.63	±5.0	557.8	580.3
6.	A_6	132	130	−1.52		130.8	133.5
7.	P_{10}	0.7	0.65	−7.14		0.658	0.700
8.	P_{11}	1.0	0.93	−7.00		0.943	0.982
9.	α_2	0.666	0.7	5.11	±10.0	0.672	0.673
10.	α_3	0.881	0.8	−9.19		0.873	0.854
11.	$C_{4,7}$	0.027	0.024	−11.11		0.026	0.026
12.	$C_{4,8}$	0.408	0.450	10.29	±50.0	0.477	0.430
13.	$C_{9,11}$	0.068	0.060	−11.76		0.062	0.073
14.	$R_{2,8}$	364.1	400	9.86		496.5	441.5
15.	$R_{2,9}$	1221.2	1000	−18.11	±25.0	1241.2	1103.7
16.	$R_{7,9}$	194.4	150	−22.84		184.1	165.5

[a]Corresponds to rounded-off temperature values to nearest 0.5°C. [b]Subscripts correspond to node numbers.

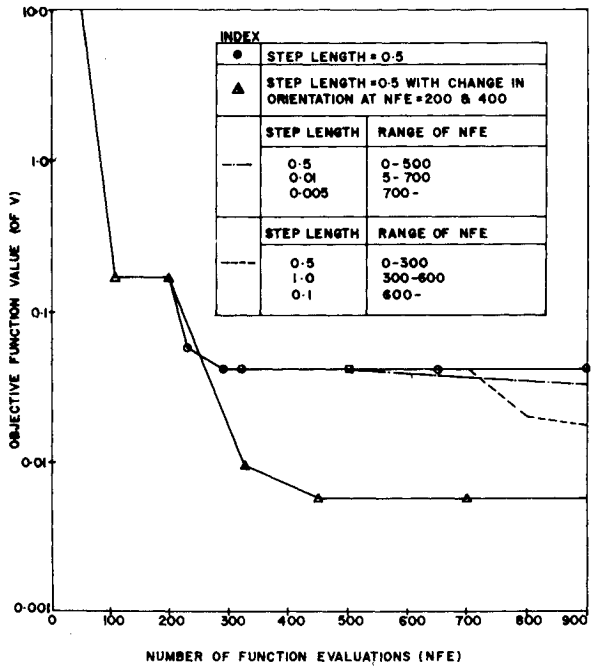

Fig. 2 Objective function value vs number of function evaluations.

values.[13] In such cases, to provide equal weighting to all the parameters, normalized OFV is used and is defined as

$$F = \sum_{j=1}^{K} \sum_{i=1}^{N} [(T_{cal} - T_{obs})/T_{obs}]^2 \qquad (5)$$

The χ^2 value for the fit between observed and measured states for dimensional and normalized OFV cases is shown in Table 2. It is preferable to use as many load conditions data (temperature measurements) as possible in a single calculation to obtain corrected parameter values.

There is no method available to choose an initial orientation or step length for the simplex to give the best extremum value of the function. However, after a few trials, one can locate the stage where the simplex is to be reoriented or new set of vertices considered. Figure 2 shows the rate of improvement in optimization due to change in orientation or step length.

The optimization method considered here for conduction and radiation exchange factors can be used for correcting the other thermal parameters, namely, radiation properties, power dissipation, etc. Table 3 shows the result for such parameters.

Both external and internal node parameters are corrected to a large extent. Large deviations in some parameters are due to the insensitivity of the parameter to temperature. Further improvement in parameter values is found to take more computational time. Correction results for observed temperature values rounded off to the nearest 0.5°C are also indicated. It is always possible to correct only those large parameters, keeping the other corrected parameter values constant.

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Errata

Prediction of Burning Rates in Nozzleless Rocket Motors

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[J. Spacecraft, **22**, 394-395 (1985)]

THE equations for A_1 and A_2 [Eqs. (7) and (8)] are reversed, and the bracketed term following P in Eq. (8) should have been superscripted. The corrected equations should read as follows:

$$A_1 = k_3 V^{k_4} P^{[k_5 + k_6 \ln(V)]} \qquad (7)$$

$$A_2 = 1 - k_1 V^{-k_2} \qquad (8)$$

This equation reversal also occurs in AIAA Paper 82-1200, on which this Synoptic is based.