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Reply by Author to P.Th. L.M. van Woerkom

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THE author wishes to thank Paul van Woerkom for his interest in our work and for his comments. At the time the original manuscript for our paper[1] was prepared, van Woerkom's work, which appeared in the European literature, was unknown to us and we apologize for any confusion that may have resulted from not citing his work in our references.

The use of $K(\theta)$ rather than $t(\theta)$ as a dependent variable is a matter of choice, and in obtaining the solution to order unity (which was our goal), we did not confront any major problem in dealing with the algebra. In addition, we are not able to justify the use of the proposed density model which is referred to in an obscure Princeton University seminar. The assumption of a standard atmospheric model leads to our Eq. (6).

In his Comment, van Woerkom notes that $u'(0)\neq 0$ but is of order ϵ. We were interested in obtaining the solution only to order unity, however, and $u'(0)=0$ is definitely correct to that order.[2] We are grateful to van Woerkom for pointing out that ω becomes undetermined as e goes to zero. But, since the eccentricity is away from zero (though very small) in our analysis, the use of e and ω or g_1 and g_2 (van Woerkom's notation) is again a matter of choice.

Finally, in integrating Eq. (19) of Ref. 1, we have made use of the fact that $1+e\cos(\theta-\omega)$ is approximately equal to unity in magnitude (since $e(0)$ is small and e is monotonically decreasing) and therefore β is independent of θ. But we acknowledge the fact, as aptly pointed out by van Woerkom, that a very pertinent piece of information, namely that angular distribution of the density is periodic, is lost. Nonetheless, the results shown in Fig. 1 of Ref. 1 are not much affected.

In conclusion, it is true that to determine $t(\theta)$ to order ϵ^n, we must know v_{n+1} completely, and this requires examining the equations for u_{n+2} and v_{n+2}.

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Errata

Semianalytic Theory for a Close-Earth Artificial Satellite

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THE last three equations of Eqs. (2) should read

$$(\dot{\Omega})_D = -\frac{1}{2}B\rho V\frac{r^2\omega_a}{\sqrt{\mu a(1-e^2)}}\sin u\cos u$$

$$(\dot{\omega})_D = -\frac{1}{2}B\rho V\frac{\sin f}{e}\left[2-\frac{r^2\omega_a\cos i}{\sqrt{\mu a(1-e^2)}}\left(2+e\cos f+\frac{e\sin u\,\cos u}{\sin f}\right)\right]$$

$$(\dot{M})_D = \frac{1}{2}B\rho V\left[\cdots\right]$$

The first-order short-periodic variations for mean anomaly given in Appendix A should read

$$M_{sp} = -\frac{3}{2}J_2\left(\frac{R}{p}\right)^2\frac{\sqrt{1-e^2}}{e}\left\{\cdots\right\}+\cdots$$

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