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Erratum: Approximate analytic solution of heat conduction in hollow semi-spheres flying at hypersonic speed International Communications in Heat and Mass Transfer, 2013, 43: 46–52

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Some formulars were found incorrect by the authors in the original paper [1]. Checking the original derivations and the formulation programs, it was found that the mistakes just happened in inputting the formulas into this paper. And the results of numerical simulation and approximate analytic solution were correct and reliable.

The simplification to formula (17) was based on the orthogonality during the integration of $P_n(\cos\varphi)$, which can be written as follows

$$\frac{2n+1}{2}\int_0^{\pi} P_m(cos\theta)P_n(cos\theta)sin\theta d\theta = \begin{cases} 0 & m \neq n \\ 1 & m = n \end{cases}$$

Hence, the formula (34) should be corrected as

$$T(r,\theta) = \sum_{n=0}^{4} A_n \left[\left(\frac{r}{r_1}\right)^n - \left(\frac{r_1}{r}\right)^{n+1} \right] P_n(cos\theta) \frac{r_2\alpha^{-n}}{n+(n+1)\alpha^{-(2n+1)}}$$

Furtherly, the formular (35) should be corrected as

$$T|_{r=r_2} = \sum_{n=0}^{4} A_n \frac{\alpha^{2n+1}-1}{n(\alpha^{2n+1}+1)+1} r_2 P_n(cos\theta)$$

the formular (36) should be corrected as

$$T|_{r=r_2,\theta=0} = \sum_{n=0}^{4} A_n \frac{\alpha^{2n+1}-1}{n(\alpha^{2n+1}+1)+1} r_2$$

the formular (37) should be corrected as

$$\left.\frac{\partial T}{\partial r}\right|_{r=r_1} = \sum_{n=1}^{4} A_n \frac{(2n+1)\alpha^{n+2}}{n(\alpha^{2n+1}+1)+1} P_n(cos\theta)$$

and the formular (38) should be corrected as

$$\left.\frac{\partial T}{\partial r}\right|_{r=r_1,\theta=0} = \sum_{n=1}^{4} A_n \frac{(2n+1)\alpha^{n+2}}{n(\alpha^{2n+1}+1)+1}$$

Declaration of Competing Interest

None.

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[1] G. Han, Z. Jiang, Approximate analytic solution of heat conduction in hollow semi-spheres flying at hypersonic speed, Int. Commun. Heat Mass Transfer 43 (2013) 46–52.

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