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Errata

Rapid Preliminary Design of Rectangular Linear Cellular Alloys for Maximum Heat Transfer

Rajesh S. Kumar and David L. McDowell
Georgia Institute of Technology, Atlanta, Georgia 30332-0405

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THE authors noticed an error in the paper after it appeared in print. The source/sink strength, which models the out-of-plane convection process, is reckoned per unit planar area [see Eq. (24) of the paper]. Hence Eq. (5) of the original manuscript should be modified as

$$\nabla \cdot (L_z \boldsymbol{D} \cdot \nabla T) + Q = 0 \qquad \text{in } \Omega \tag{5}$$

where L_z is the out-of-plane length of the LCA. Furthermore, the left-hand side and the first term on the right-hand side of Eqs. (8), (9), and (11) should also be multiplied by L_z. With this correction, Eq. (16) should read

$$\left(\int_{\Omega^e} [B^e]^T [D^e][B^e] L_z \, \mathrm{d}A + \int_{\Omega^e} \alpha^e_{\text{eff}} [N^e]^T [R^e] \, \mathrm{d}A \right) \{T^e\} = - \int_{\partial\Omega^e_h} [N^e]^T h^e L_z \, \mathrm{d}s + \int_{\Omega^e} \alpha^e_{\text{eff}} [N^e]^T T_0 \, \mathrm{d}A \tag{16}$$

Correcting this error reduces the total heat transfer rate reported in the paper by about 20–25% for the first boundary condition (BC1) and 3–5% for the second boundary condition (BC2). Hence the total heat transfer rate as predicted by the proposed finite element methodology is much closer to the three-dimensional finite difference solution than originally reported. The topological designs (both uniform and graded) presented in the paper remain the same; only the total heat transfer rates as reported are reduced. Thus the two-dimensional approximate methodology presented in the paper not only yields a relatively fast analysis approach to support preliminary design but also leads to quite accurate predictions of the total heat transfer rate when compared to three-dimensional solutions. We regret this error and any confusion it may have caused.