ERRATUM

Erratum to: Natural convection heat transfer of a viscous fluid in a vertical porous channel

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The original article was published with typographical errors in the nondimensionalization.

The corrected version of the nondimensionalization, the present address of the fourth author, and the present e-mail addresses of the fourth and the corresponding authors are given in the erratum. The Mathematics Subject Classification codes which are omitted in the original publication are also given below.

Mathematics Subject Classification 35K05 · 60H05 · 91G80

In Akyildiz et al. [1] we considered the ODE system (2.7) and (2.11) which takes the form

$$k \frac{d^2 T}{dy^2} + \mu \left(\frac{du}{dy} \right)^2 + Q'' = 0, \quad \frac{d^2 u}{dy^2} - \frac{1}{K} u + \frac{\beta_0}{\mu} \left(1 + \frac{\beta_1}{\beta_0} \tau \right) \rho g \tau = 0, \quad (1)$$

governing natural convection heat transfer of a viscous fluid in a vertical porous channel. Here $\beta_0 = (\partial \rho / \partial T)_S$ and $\beta_1 = (\partial^2 \rho / \partial T^2)_S$ are, respectively, the LDT and the QDT parameters, $\tau = T - T_S$, and we take $d(p - p_S)/dx = 0$ (see, for details [2–4]). Note that β_0, β_1 can be given different functional forms, but in practice these values can be

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estimated experimentally and hence these expressions are not used here (they are simply taken to be fixed constants). We also introduce the parameter $\chi = (T_0 - T_S)/\Delta T$.

Unfortunately, there were typographical errors in two of the non-dimensional parameters in [1]. The correct non-dimensionalization is $y^* = y/d$, $u^* = u/\tilde{u}$ and $\theta^* = \tau/\Delta T$, where $\Delta T = k\mu/(\rho^2\beta_0^2g^2d^4)$ and $\tilde{u} = \sqrt{k\Delta T/\mu}$. Note that this corrects the form of $\tilde{u}$. Here we omitted a factor of χ that canceled from $\tilde{u}$ and hence was not needed in the definition of u^* in [1], and we have taken the appropriate scaling with k rather than K or χ as was incorrectly used in previous papers. These put (2.7), (2.11) and relevant boundary conditions into the form (dropping stars for convenience) of (2.12)–(2.14):

$$\frac{d^2u}{dy^2} - \frac{1}{\text{Da}}u + \theta + \Gamma\theta^2 = 0, \quad \frac{d^2\theta}{dy^2} + \left(\frac{du}{dy}\right)^2 + \alpha\chi = 0, \quad (2)$$

$$u(0) = 0, \quad u(1) = 0, \quad \theta(0) = \chi, \quad \theta(1) = m\chi, \quad (3)$$

where $\text{Da} = K/d^2$ is the Darcy number, $\Gamma = \Delta T\beta_1/\beta_0$ is the QDT parameter, $\alpha = Q''d^2/(k(T_0 - T_1))$ is the heat source/sink parameter, and $m = (T_1 - T_S)/(T_0 - T_1)$ is the wall temperature ratio parameter. Note that this corrects the value of α which was incorrectly written as $\alpha = Q''d^2/(\chi(T_0 - T_1))$ in [1].

Since only non-dimensional parameters were used in the remainder of [1], the later sections and findings of [1] remain unchanged by the corrected scalings.

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