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Comment on the paper "Microsystem Technologies, https://doi.org/10.1007/s00542-018-3996-x"

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Abstract
The present comment concerns some doubtful results included in the above paper.

In the above paper the energy equation (Eq. 3 in Saleem et al. 2018) is as follows

$$(\rho c)_f\left(\frac{\partial T}{\partial t}+u\frac{\partial T}{\partial x}+v\frac{\partial T}{\partial y}\right) = \kappa\frac{\partial^2 T}{\partial z^2}+(\rho c)_p\left\{D_B\frac{\partial C}{\partial z}\frac{\partial T}{\partial z}+\frac{D_T}{T_\infty}\left(\frac{\partial T}{\partial z}\right)^2\right\} - \frac{1}{\rho C_p}\frac{\partial q_r}{\partial y}+\frac{\mu}{\rho C_p}\left(\frac{\partial u}{\partial y}\right)^2+\frac{Q_0}{\rho C_p}(T-T_\infty) \quad (1)$$

The units of the term $(\rho c)_f\left(\frac{\partial T}{\partial t}+u\frac{\partial T}{\partial x}+v\frac{\partial T}{\partial y}\right)$ are $kg(mass)m^{-1}(length^{-1})\sec^{-3}(time^{-3})$, whereas the units of the term $\frac{\mu}{\rho C_p}\left(\frac{\partial u}{\partial y}\right)^2$ are $Kelvin(temperature)\sec^{-1}(time^{-1})$. This means that the Eq. (1) is wrong taking into account that all terms must have the same units.

Another subsequent form of the above equation is the following (Eq. 6 in Saleem et al. 2018)

$$(\rho c)_f\left(\frac{\partial T}{\partial t}+u\frac{\partial T}{\partial x}+v\frac{\partial T}{\partial y}\right) = \kappa\left(1+\frac{16\sigma^* T_\infty^3}{3k^*}\right)\frac{\partial^2 T}{\partial z^2}+(\rho c)_p\left\{D_B\frac{\partial C}{\partial z}\frac{\partial T}{\partial z}+\frac{D_T}{T_\infty}\left(\frac{\partial T}{\partial z}\right)^2\right\} + \frac{\mu}{\rho C_p}\left(\frac{\partial u}{\partial y}\right)^2+\frac{Q_0}{\rho C_p}(T-T_\infty) \quad (2)$$

The units of the term $\frac{16\sigma^* T_\infty^3}{3k^*}$ are $kg(mass)Kelvin^{-1}(temperature^{-1})m(length)\sec^{-3}(time^{-3})$, whereas the term 1 is dimensionless. In Physics you can not add quantities with different units and for that reason the Eq. (2) is also wrong.

The Prandtl number and the Schmidt number are defined as $\Pr=\frac{\vartheta}{k}$, $Sc=\frac{\vartheta}{D_B}$but ϑ and k do not exist in the paper.

In addition the radiation parameter R has not been defined in the paper. It is unknown.

In the transformed Eqs. (9) and (10) a parameter s appears. However, no such parameter exist in the paper.

Reference

Saleem S, Nadeem S, Rashidi MM, Raju CSK (2018) An optimal analysis of radiated nanomaterial flow with viscous dissipation and heat source. Microsyst Technol. https://doi.org/10.1007/s00542-018-3996-x

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