Comments on the paper “Flow and heat transfer analysis of carbon nanotubes-based Maxwell nanofluid flow driven by rotating stretchable disks with thermal radiation” by P. Sudarsana Reddy, K. Jyothi, M. Suryanarayana Reddy; Journal of the Brazilian Society of Mechanical Sciences and Engineering (2018) 40:576

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Dear Editor,

These comments demonstrate some wrong and misleading results presented in the paper by Sudarsana Reddy et al. [1]. The momentum and energy equations in [1] are defined as follows, for a non-Newtonian fluid:

$$\begin{aligned} u \frac{\partial u}{\partial r} - \frac{v^2}{r} + w \frac{\partial u}{\partial z} + \lambda_1 \left(v^2 \frac{\partial^2 u}{\partial z^2} + u^2 \frac{\partial^2 u}{\partial r^2} + 2uv \frac{\partial^2 u}{\partial r \partial z} \right) \\ = \frac{-1}{\rho_{nf}} \frac{\partial p}{\partial r} + \frac{\mu_{nf}}{\rho_{nf}} \left(\frac{\partial^2 u}{\partial r^2} + \frac{1}{r} \frac{\partial u}{\partial r} - \frac{u}{r^2} + \frac{\partial^2 u}{\partial z^2} \right) \\ + \frac{\sigma_{nf}}{\rho_{nf}} B_0^2 \left(-u - \lambda_1 v \frac{\partial u}{\partial z} \right), \end{aligned} \quad (1)$$

$$\begin{aligned} u \frac{\partial v}{\partial r} + \frac{uv}{r} + w \frac{\partial v}{\partial z} + \lambda_1 \left(v^2 \frac{\partial^2 u}{\partial z^2} + u^2 \frac{\partial^2 u}{\partial r^2} + 2uv \frac{\partial^2 u}{\partial r \partial z} \right) \\ = \frac{-1}{\rho_{nf}} \frac{\partial p}{\partial z} + \frac{\mu_{nf}}{\rho_{nf}} \left(\frac{\partial^2 v}{\partial r^2} + \frac{1}{r} \frac{\partial v}{\partial r} - \frac{v}{r^2} + \frac{\partial^2 v}{\partial z^2} \right) \\ + \frac{\sigma_{nf}}{\rho_{nf}} B_0^2 \left(-v - \lambda_1 u \frac{\partial v}{\partial z} \right), \end{aligned} \quad (2)$$

$$u \frac{\partial w}{\partial r} + w \frac{\partial w}{\partial z} = \frac{-1}{\rho_{nf}} \frac{\partial p}{\partial r} + \frac{\mu_{nf}}{\rho_{nf}} \left(\frac{\partial^2 w}{\partial r^2} + \frac{1}{r} \frac{\partial w}{\partial r} + \frac{\partial^2 w}{\partial z^2} \right), \quad (3)$$

$$u \frac{\partial T}{\partial r} + w \frac{\partial T}{\partial z} = \frac{k_{nf}}{(\rho c_p)_{nf}} \left(\frac{\partial^2 T}{\partial r^2} + \frac{1}{r} \frac{\partial T}{\partial r} + \frac{\partial^2 T}{\partial z^2} \right) - \frac{1}{(\rho c_p)_{nf}} \frac{\partial q_r}{\partial z}. \quad (4)$$

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Sudarsana Reddy et al. [1] considered the flow of a Maxwell nanofluid with single- and multi-wall carbon nanotubes as nanoparticles. However, Table 1 in Ref. [1] shows the thermophysical properties for pure water (base fluid), which is Newtonian (viscous). Therefore, the authors have not used the properties of a non-Newtonian Maxwell fluid in their calculations. For example, Pr was considered equal to 6.2, and the graphical results in Ref. [1] were presented for water–carbon nanotubes. Consequently, the results are not correct. Further, the skin friction coefficient in Ref. [1] does not involve the relaxation time λ_1 . As a result, there is no difference between the skin friction coefficient for viscous and Maxwell nanofluids.

Thus, in view of the above discussion, it is concluded that the published work in Ref. [1] is unreliable and incorrect for further research work.

Reference

1. Sudarsana Reddy P, Jyothi K, Suryanarayana Reddy M (2018) Flow and heat transfer analysis of carbon nanotubes-based Maxwell nanofluid flow driven by rotating stretchable disks with thermal radiation. J Braz Soc Mech Sci Eng 40:576

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