Comments on " MHD viscous Casson fluid flow and heat transfer with second-order slip velocity and thermal slip over a permeable stretching sheet in the presence of internal heat generation/absorption and thermal radiation " by Ahmed M. Megahed . Eur. Phys. J. Plus (2015) 130: 81

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The aim of this paper [1] is to study the effects of second- order slip and thermal slip on the flow and heat transfer of MHD non -Newtonian Casson fluid flow past a permeable stretching sheet with thermal radiation and heat generation/absorption. **There are many fundamental errors :**

1- Using Eq.(1) it is easy to show that the boundary condition in Eq.(5) for the surface velocity is wrong. Consequently, $f'(0)$ in Eq.(10) is wrong**.** Since the dimensionless energy equation (12) depends on f *and* f', then all results obtained for the dimensionless velocity f' and the dimensionless temperature θ as well as the local skin-friction coefficient and the local Nusselt number are wrong .

2- Wu [2] derived the second-order slip model for rarefied gas flows for arbitrary Knudsen number. Colin et al. [3] experimentally found that for gaseous flow this second-order slip flow model is more precise than a first-order one, which underestimates the flow rate when the Knudsen numbers are higher than 0.05. The second-order slip model is predictive with high precision up to the Knudsen numbers equal to 0.25.

It is known that typical values for the Prandtl number P_r around 0.7 – 0.8 for air and gases.

The author used a non-Newtonian Casson fluid with $P_r = 3$. Examples of Casson fluids were given by the author as : jelly, tomato sauce, honey, soup, concentrated fruit juices, etc.,i.e. liquid fluids. The mean free paths of liquids are much smaller than those of gases, the continuum assumption may hold for liquids but fail for gases [4]. Using liquid fluids such as water, jelly, tomato sauce, honey, soup ,blood plasma tend to avoid having temperature jump at the surface.

From the above it is obvious that the second-order slip flow model and thermal slip at the surface are not matching with using Casson fluid (liquid fluid) .

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Conclusions

From the above it is obvious that all results obtained and the mathematical formulation used to describe the physical model in the above paper are wrong .

References

[1] Megahed**,**A.M**. ,** "MHD viscous Casson fluid flow and heat transfer with second-order slip velocity and thermal slip over a permeable stretching sheet in the presence of internal heat generation/absorption and thermal radiation," Eur. Phys. J. Plus 130: 81 (2015) .

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