

# Numerical study for unsteady Casson fluid flow with heat flux using a spectral collocation method

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## Abstract

An efficient numerical method is presented in this study to discuss the effects of variable heat flux, viscous dissipation and the slip velocity on the viscous Casson flow and heat transfer due to an unsteady stretching sheet taking into account the influence of heat generation or absorption. Industrially, this type of fluid can describe the flow of blood in an industrial artery, which can be polished by a material governing the blood flow. The spectral collocation method based on Chebyshev polynomials of the third-kind is employed to solve the resulting system of ordinary differential equations which describe the problem. Influence of the parameters governing the flow and heat transfer such as unsteadiness parameter, slip velocity parameter, Casson parameter, local Eckert number, heat generation parameter and the Prandtl number are discussed and presented through tables and graphs. Also, the local skin-friction coefficient and the local Nusselt number at the stretching sheet are computed and discussed. Finally, the results show that the given procedure is an easy and efficient tool to investigate the solution of such fluid models.

## Hosted file

Project-IJP.pdf available at <https://authorea.com/users/302459/articles/485105-numerical-study-for-unsteady-casson-fluid-flow-with-heat-flux-using-a-spectral-collocation-method>