Casson Fluid Flow with Heat Sink Affected by Symmetric Wall Temperature and Concentration Conditions

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Abstract:

Casson fluids is commonly used in many notable technological and industrial properties, such as synthetic lubricants, specific oil paints, biological fluids, diverse polymer solutions to mention few. The Casson fluid is considered to be one of the most prominent types of fluids within the category of non-Newtonian substances. There are some features that defy comprehension when analyzed solely through lens of the Newtonian flow model. Consequently, utilization of the noon-Newtonian fluid motion is more advantageous. The problem of Casson fluid flow with heat sink impacted by symmetric wall temperature and concentration conditions has been investigated in this research. The governing equations of the model are solved analytically using the theory of simultaneous ordinary differential equations. The influence of several dimensionless factors relevant to velocity, temperature, concentration, Skin friction, rate of heat transfer, and rate of mass transfer are investigated and depicted through graphs. It has been discovered that increasing the Casson fluid and heat sink values significantly reduces the fluid's velocity and temperature. The existence of symmetric wall temperature and concentration substantially influences flow development and reversal.