

Title: Hydromagnetic flow of Casson nano-fluid across a stretched sheet in the presence of thermoelectric and radiation

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Abstract: This work revealed the investigation of the Casson nanofluid flow's MHD (magneto-hydrodynamic) unstable boundary layer characteristics in the simultaneous transmission of thermoelectric and radiation on a stretched sheet. On MHD Newtonian and non-Newtonian (Casson) nanofluid flows, the cumulative impact of radiation and thermoelectricity has been addressed. Thermal radiation, Casson nanofluids, and MHD are pivotal in engineering and industry, transforming applications like heat exchangers, nuclear power plants, thermal energy storage, and advanced drug delivery systems. The problem-related partial differential equations have been formulated with boundary layer approximation. The boundary layer equations have been changed into dimensionless form with the help of appropriate dimensionless variables and parameters. Finite difference techniques have been employed to get the numerical solution via the FORTRAN 6.6a programming algorithm, and the numerical solutions have been illustrated graphically with the support of Tecplot-360 software. The consequences of the numerous parameters have been investigated using a variety of figures, with the amounts of the various parameters being revised. The simultaneous effects of thermoelectric and radiation on primary velocity, secondary velocity, and temperature profiles have been presented and discussed with critical physical properties such as skin friction in addition to Nusselt number. The combined effects of thermoelectric and radiation on streamlines and isotherms have been illustrated with line and contour flood views. The most significant finding is that the collective influence of thermoelectric and thermal radiation impacts promotes the physical phenomena of non-Newtonian (Casson) fluid flow comparatively more than Newtonian fluid flow. For the purpose of creating effective procedures, forecasting flow patterns, and guaranteeing product performance in a variety of industries, it is crucial to explain the Casson fluids. This model can also aid in blood flow simulation and risk assessment for thrombosis and other cardiovascular diseases.

Keywords: Water pollutants, Environmental remediation, Adsorption, Hydrogel, Microporous structure, PH-dependent adsorption, Methylene blue

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