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VON Kármán Casson fluid flow with Navier's slip and cattaneo-christov heat flux

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Abstract:
In the current article, the Von Kármán swirling flow problem is extended for Navier's slip condition on the stretching rotating disk surface with the Cattaneo-Christov heat flux. A semi-analytical study of magnetohydrodynamic Casson fluid flows over the rotating disk is carried out. The impact of the Joule heating and convective heating condition is considered. The nonlinear partial governing equations are transformed into the ordinary governing equations by using the similarity transformation technique and then solved by the optimal homotopy analysis method. The consequence of the pertinent parameters such as the Biot number, magnetic field, stretching parameter, Eckert number, and slip velocity parameter on the velocity and temperature distribution are graphically displayed and discussed. The study reveals that the thickness of the momentum boundary layer is decreased by the slip velocity parameter and the stretching rate of the disk. The thermal relaxation time has enhanced the rate of heat transfer and reduced the temperature profile in the fluid.