Model for MHD Flow of Casson Nanofluid Over A Stretching Sheet With Newtonian Heating and Thermal Radiation Effects

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Abstract: The boundary layer and heat transfer flow of Casson nanofluid past over a stretching sheet with Newtonian heating have been studied numerically. The effect of magnetic field and thermal radiation have been examined well. Subjected to the similarity transformations, the governing equations are then reduced to non-linear ordinary differential equations. The effects of non-Newtonian Casson parameter, radiation parameter, magnetic parameter, Prandtl number, Brownian motion parameter, Schmidt number and thermophoresis parameter on temperature, concentration and velocity fields are shown graphically and discussed. In order to get physically appropriate solutions, the numerically solutions for non-Newtonian parameter have been carried out with the asymptotic boundary conditions.

Introduction

The convection of heat transfer flows over boundary layer of non-Newtonian fluids have been investigated widely in a several of applications and great in engineering fields. Eventhough the non-Newtonian fluids are complicated than Newtonian fluids since the fact of classical Navier Stokes equations are not appropriate precisely to descride on the rheological behaviour of non-Newtonian fluids. Therefore, many of non-Newtonian fluid models have been proposed to sovle the certain problem. One of the model is Casson nanofluid. Casson (1995) who firstly introduced this model to investigate the behaviour flow of pigment oil suspensions. In fact, Casson fluid is a plastic fluid and required a higher shear stress (as long as bigger than the yield stress) so just can begin the flow in the system. Nanofluids are being believed that it can enhance thermal conductivity greatly. Thus, the combination of this model with nanofluid have attract the concern from some researchers due to the unique charaterictics and functions and may applying in some application like industry usage, good approximation for biological fluids and other materials.