Effect of Non-linear Radiation on MHD Mixed Convection Flow of a Micropolar fluid Over an Unsteady Stretching Sheet

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Abstract: The current analysis explores the results of non-linear radiation on an unsteady stretching mixed Micropolar fluid. Issue modelling leads to a framework of PDE, reworked by transformations into non-linear ODEs. The Homotopy analysis methodology is applied to resolve the matter. The diagrams address the impact of the Magnetic parameter, unsteadiness parameter, Eckert number, Micropolar parameters, buoyancy parameters, Radiation parameter, Temperature ratio and Schmidt number on velocity, temperature, and concentration gradients. Amount of Nusselt number will increase in massive Prandtl number values, within the case of the high values of the unsteadiness parameter skin friction, wall couple stress and Sherwood decrease.
Keywords: Micropolar fluid, Mixed convection, HAM, Nonlinear radiation.

1. Introduction:

Non-Newtonian fluids have overwhelmed in recent decades by their relationship with applied science and industry. Non-Newtonian fluid motion plays an especially important part in theory and many of the manufacturing phases. It does not comply with Newton's principle of conservation of mass; the fluid in hydraulic motors and power steering can move from a liquid to a solid. During a variety of industrial processes, such as drawing compound layers or continuously stripped filaments out of a mould, cooling of the metal sheet during a bath, mechanical extraction of plastic layers, rolls, rinsing, boundary layer flow and heating transfer, powered by an endless stretch sheet during a calming Newton and non-Newtonian fluid.

The effects of the heat produced by radiation on an electrically charged fluid have been studied by Sheikholeslami et al. [1]. Kataria and Mittal [2] study the effects of an optically thick nanofluid on an unstable MHD flow over a vertical plate based on radiation parameters and a set of physical parameters. In a natural fluid past a vertical platform, Ostrach [4] solved the conventional problem of a gravitational convection. Siegel [4] is likely to be the first to look in a semi-infinite integral layer for free convective transient flows. El-Amin [5] was studied in the Micropolar fluid with continuous suction for magneto hydrodynamic free convection. Zhixiong Li et al. [6] has researched the migration of nano fluids in the presence of Lorentz forces and the properties of the nanofluid are predicted in view of the Brownian motion. The MHD boundary layer nanofluid flow and heat transfer was introduced by Das [7] via a vertical stretching sheet. Mittal and Patel [8] developed MHD Casson fluid Flows through porous medium with the effect of nonlinear thermal radiation, chemical reactions, and heat generation. Mittal and Kataria [9] have studied in detail the Brownian motion, the fraction in nanoparticles' volumes and the suspension effect of nano-fluid mixing. A group of Researchers Nadeem et al. [10] proposed a theoretical structure solution for the MHD boundary layer physics and they applied their theory to the laboratory with the aid of computers. Kataria and Mittal [11] are