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Short Communication

A Brief Note on Third Grade Flow of Nanofluid over a Riga Plate: Cattaneo-Christov Model

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INTRODUCTION

Heat and mass transfer occur often in a variety of industrial and manufacturing processes, including maritime engineering, nuclear up and down processes, pharmaceuticals, distillation columns, and the petroleum industry, among others. Most previous investigations have used traditional heat and mass transfer theories, but when relaxation durations for velocity fields are changed, both temperature and concentration fields are affected to a greater extent, necessitating the consideration of thermal and mass diffusions. Cattaneo looked at Fourier's law for heat conduction and discovered that when a thermal relaxation period is added to Fourier's rule, heat is transported via thermal wave propagation with a limitless speed. After that, Christov updated Cattaneo's model by integrating Oldroyd's upper convective derivative, making it material-invariant. The formulation has been completed. Many researchers agree that the perception created as Cattaneo-Christov the ory is correct. The magnetohydrodynamic flow towards the cone,

Wedge and plate was investigated by Cattaneo-Christov. They used the RK-Fehlberg numerical technique and discovered that the thermal relaxation parameter can cause the temperature of the liquid to decline when it is involved in the Cattaneo-Christov heat flux in a viscoelastic flow over a stretched surface fixed in the vertical direction. MHD and velocity slip conditions are also included in the research. When the Riesz-fractional Cattaneo–Christov flux describes the conduction situation, heat conduction was investigated. Sui presented the effect of the Cattaneo-Christov double-diffusion principle on Maxwell nanofluid moving on a stretching sheet, while slip velocity also determines the flow [1].

DESCRIPTION

In a squeezing nanofluidic flow confined within adjacent parallel plates and stimulated by thermal radiation and Cattaneo-Christov heat flux, Dogonchi and Ganji deduced that in the case of Fourier's law, a higher temperature distribution is observed in the case of a squeezing nanofluidic flow confined within adjacent parallel plates and stimulated by thermal radiation and Cattaneo-Christov heat flux. As compared to Cattaneo-concept Christov's The Duan-Rach method is used to achieve the desired outcomes. Upadhay used the shooting method established on Runge–Kutta to inspect the Cattaneo–Christov flux on an unsteady Powell–Eyring dusty nanofluidic flow past a sheet. Based on the Cattaneo-Christov model with MHD nanofluid flowing over a stretching surface in an inclined condition, there is a double diffusion effect of heat and mass [2].

In addition, various investigations based on the Cattaneo-Christov model's claims have been carried out in Nowadays, we frequently see circumstances where the diameters of heat transfer devices running at high speeds shrink, resulting in increased temperature, necessitating the provision of adequate cooling. The use of nanofluids can help to tackle the problem of high temperature. Nanoparticles are suspended in any type of ordinary fluid, such as water, oil, or ethylene glycol, to create these fluids. Nanofluids in very low concentrations can be used to meet the cooling needs of thermal systems. Choi first proposed this breakthrough concept in 1995. When suction/injection, thermal radiation, convective boundary condition, and nanoparticle volume fraction operate on the flow, undertook an analytical investigation for magnetohydrodynamic nanofluidic flow. Within a microchannel, flow is induced between permeable surfaces [3].

Variable magnetic field was used to practise the Brinkman model of an unsteady squeezing nanofluid flow. They used the Galerkin method to show that a greater Hartmann number improves both velocity and temperature distributions, although a higher Hartmann number reduces velocity profile. a number to squeeze Hayat investigates the melting heat transfer near a stagnation point during nanofluid flow across a stretchy surface in the presence of an angled magnetic field. Heat generation/absorption and nonlinear thermal radiation have an impact on the energy equation. The entropy phenomenon for Al_2O_3-water nanofludic flow confined to a porous microchannel was numerically treated by López. The flow is immediately modified by the elements of MHD, suction/ injection, and nonlinear radiative heat flux. Sandeep investigated the effects of a transverse magnetic field and a heat source/sink in the scenario of nanofluid flow towards a thin elastic sheet, with the results being studied for a liquid film [4].

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CONCLUSION

The shooting process is used to determine that water-AA 7075 has a higher rate of heat transmission than water-AA 7072. Sheikholeslami studied the flow of a water-Fe_2O_3 nanofluid within an enclosure with sinusoidal moving walls in the presence of forced convection. Temperature gradient is discovered to be a growing agent for lid velocity and Fe_2O_3 volume fraction in this study. Shagaiy assessed the impact of using Buongiorno's model for the instance of nanofluidic flow via a permeable stretchy sheet. On the EMHD flow of nanofluids, viscous dissipation, Joule heating, and thermal radiation are studied. Hsiao used the implicit finite difference approach to investigate the mixed convection flow of viscoelastic Carreau-nanofluid near a stagnation point, with the flow being affected by EMHD, Ohmic dissipation, and activation energy [5].

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None

Conflict of Interest

None

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