Magnetohydrodynamics • Volume 57, Issue 3, Pages 291 - 303 • 2021

Document type
Article

Source type
Journal

ISSN
0024998X

DOI
10.22364/mhd.57.3.1

Publisher
University of Latvia

Original language
English

THE IMPACT OF NEWTONIAN HEATING ON MAGNETIC CASSON NANOFLUID FLOW WITH VARIABLE CONSISTENCY OVER A VARIABLE SURFACE THICKNESS

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Abstract

A boundary layer flow of Casson nanofluid passing through a heated slab due to Newtonian heating with inconstant viscosity streaming over a varying surface thickness is investigated. The fluid flow equations which are non-linear PDE are converted to non-linear ODE by suitable similarity transformation. A numerical approach is used to solve those equations along with several values of pertinent parameters such as the velocity power constant m, the magnetic parameter H, the fluid viscosity parameter Ω, the Biot number Bi and the surface thickness parameter α, using the finite difference method. Detailed impacts of these parameters on the surface are thoroughly discussed and necessary tables and graphs are plotted for this reason. Comparison with previously reported results is made for the sake of validation. The velocity power constant m is observed to increase the $-f''(0)$ value only for positive fluid viscosity Ω, to increase the surface temperature $\theta(0)$ and to decrease $-\phi'(0)$ except for Ω =−3.

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Funding details

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