World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:15, No:12, 2021

Comparative Analysis of Water-Based Alumina Nanoparticles with Water-Based Cupric Nanoparticles Past an Exponentially Accelerated Vertical Radiative Riga Plate with Heat Transfer

Authors : Kanayo Kenneth Asogwa

Abstract : The influence of the flow of nanoparticles in nanofluids across a vertical surface is significant, and its application in medical sciences, engineering, pharmaceutical, and food industries is enormous & widely published. However, the comparative examination of alumina nanoparticles with cupric nanoparticles past a rapid progressive Riga plate remains unknown. Thus, this report investigates water-based alumina and cupric nanoparticles passing through an exponentially accelerated Riga plate. Nanofluids containing copper (II) oxide (CuO) and aluminum oxide (Al2O3) nanoparticles are considered. The Laplace transform technique is used to solve the partial differential equations guiding the flow. The effect of various factors on skin friction coefficient, Nusselt number, velocity and temperature profiles is investigated and reported in tabular and graphical form. The upsurge of Modified Hartmann number and radiative impact improves copper (II) oxide nanofluid compared to aluminum oxide nanofluid due to Lorentz force and since CuO is a better heat conductor. At the same time, heat absorption and reactive species favor a slight decline in Alumina nanofluid than Cupric nanofluid in the thermal and velocity fields. The higher density of Cupric nanofluid is enhanced by increasing nanoparticle volume fraction over Alumina nanofluid with a decline in velocity distribution.

Keywords : alumina, cupric, nanoparticles, water-based
Conference Title : ICAMTCM 2021 : International Conference on Applied Mathematics, Theoretical and Computational Mechanics
Conference Location : Paris, France
Conference Dates : December 30-31, 2021