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Int. J. of Applied Mechanics and Engineering, 2020, vol.25, No.2, pp.142-156
DOI: 10.2478/ijame-2020-0026

OUTCOME OF NANOFLUID FLOW CONTAINING ARBITRARY SHAPE NANOPARTICLES INDUCED BY A PERMEABLE STRETCHING SHEET

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In this work we have discussed the impact of thermal radiation on heat transfer to nanofluid flow over an unsteady permeable stretching sheet using various types of arbitrary shape nanoparticles of Copper (Cu), Silver (Ag), Alumina (Al_2O_3), and Titania Oxide (TiO_2) in the base fluid. Suitable transformations have been employed to build ODEs from the partial differential equations. Numerical results are therefore obtained particularly for cylindrical shape and spherical shape nanoparticles. Our analysis substantiates that the velocity and temperature profiles increases with enhanced thermal radiation parameter. Further, Nusselt number is more advanced for the nanofluid that contains cylindrical shape nanoparticles as compared to spherical shape nanoparticles.

Key words: nanofluid, heat transfer, boundary layer flow, thermal radiation, permeable stretching sheet.

2010 Mathematics Subject Classification. 76W05

1. Introduction

In the case of heat transfer, thermal conductivity of fluids deed as a clamorous part in various branches of engineering and science. Common fluids (e.g. water, toluene, oil etc.) which are usually used in power reproduction, cooling system, chemical production, micro-electronics etc., are relatively low thermal conductive and consequently need more advancement in the thermal conductive nature. Choi [1] designed the idea to upgrade the thermal conductivity of base liquids by suspending high thermal conductive diminutive metallic particles in it. Afterward, that idea was communicated by several researchers by taking various metallic, non metallic nanoparticles or their oxides or carbon nanotubes (CNT's). Sarkar *et al.* [2] studied the outcome of the bioconvection on a nanofluid that saturated in a non-Darcian porous medium. Raju and Sandeep [3] numerically survey the heat and momentum transport of $CoFe_2O_4$ -water nanofluid which flows over a spinning cone. Chakraborty *et al.* [4] exploit Ag-water to improve the convective flow over an inclined plane in existence of non-Darcy porous medium and solar radiation. More significant works [5-8] on nanofluid can be found in open literature. The development of thermal conductivity of common fluid not only depend the appearance of nanoparticles but also their shapes and size [9]. Murshed *et al.* [10] examined that CNTs can attained better thermal conductivity (approximately six times) than metallic nanoparticles in nanofluids. Recently, flow description of MHD nanofluid carrying both cylindrical and spherical shape nanoparticles have been examined by Das *et al.* [11].

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