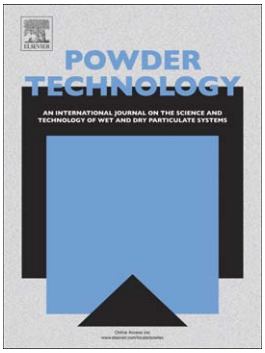

3D free convective MHD flow of nanofluid over permeable linear stretching sheet with thermal radiation

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Abstract

This paper mainly focuses on the influence of transverse magnetic field as well as thermal radiation on three-dimensional free convective flow of nanofluid over a linear stretching sheet. One remarkable aspect of this study is that a new micro-convection model namely Patel model has been introduced in view of enhancement of thermal conductivity and hence more heat transfer capability of nanofluid. The non-linear partial differential equations have been converted into strong non-linear ordinary differential equations by employing suitable transformations and these transformed equations are solved by Runga-Kutta method of fourth order along with Shooting technique as well as Secant method for better approximation. From this study, it is found that the presence of magnetic field slows down the fluid motion while it enhances the fluid temperature leading to a reduction in heat transfer rate from the surface. It is also found that enhancing thermal radiation parameter causes a reduction in heat transfer rate.

Keywords: MHD; 3D flow; Nanofluid; Free convection; Thermal radiation.

1. Introduction

Over the last decade, many researchers have been attracted the interests of doing research on nanofluids in view of their fascinating and significant engineering focus with respect to usefulness and applications that include cooling involved in cancer therapy, safer surgery, vehicles, transformers, solid state lighting, super powerful computers, nuclear reactors, electronic devices used in military sectors, biomedicine, various process industries involving materials and