A Mathematical Analysis Of Radiation And Thermal Diffusion Effect On A Steady MHD Free Convection Heat And Mass Transfer Flow Past An Inclined Stretching Sheet

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Abstract

This paper investigates the radiation and thermal diffusion effect on a steady MHD free convection heat and mass transfer flow past an inclined stretching sheet with Hall current and heat generation. The non-linear differential equations governing the model are solved analytically using Modified Homotopy analysis method. The primary velocity, the secondary velocity, temperature profile and concentration profile are derived and their effects on varying the parameters like Magnetic parameter, Hall parameter, Heat generation, Radiation parameter, Dufour number, Local thermal Grashof number, Local solutal Grashof number, Prandtl number, Soret number, Schmidt number and angle of inclination are observed graphically. The obtained expressions are utilized to get the skin friction coefficient, the local Nusselt number and the local Sherwood number and are compared with the numerical results.

Keywords

Hall current, Heat generation, Non-Linear differential equations, Energy, Primary and secondary velocity, Modified Homotopy analysis method.

1. Introduction

The study of MHD flow plays an important role in various industrial applications. Some important applications are cooling of nuclear reactors, liquid metals fluid, power generation system and aero dynamics. The problems of heat and mass transfer past an inclined stretching sheet with Hall current and heat generation have attracted considerable attention during the last few decades. It is important in connection with many engineering problems, such as wire