A MATHEMATICAL ANALYSIS OF A CHEMICAL REACTION ON A MHD MICROPOLAR FLUID FLOW

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Abstract:

The goal of this research is to investigate the micropolar fluid behaviour of a steady MHD heat and mass transfer flow over a stretched surface under Newtonian heating (NH), constant wall temperature (CWT), and constant heat flux (CHF) boundary conditions. This paper looked at heat generation and absorption as well as destructive and generative chemical reactions. The controlling nonlinear partial differential equations are turned into dimensionless ordinary coupled nonlinear differential equations using the similarity technique. The modified Homotopy analysis method is adapted to solve the dimensionless equations analytically.

Keywords:

MHD channel flow, micropolar fluid flow, dimensionless velocity profile, micro rotation profile, temperature profile, concentration profile, modified Homotopy analysis method.

1. Introduction

In the last decade, researchers have discovered that the flow across a stretched surface has a significant impact on the flow and heat transfer characteristics of a micropolar fluid. Because of its numerous applications in countless engineering and geophysical domains, convection heat transfer in fluid flow is a phenomenon of enormous interest from both a theoretical and practical standpoint. Over the last few decades, combined free and induced convection over a stretching surface has been extensively researched from both a theoretical and experimental standpoint.

The impact of a magnetic field on free convection heat transport on a vertical plate was studied by [2]. [3] investigated natural convection flow of an electrically conducting fluid across a vertical plate. [4] to [9] have investigated the flow and heat transfer characteristics of a stretching sheet in the presence of a uniform magnetic field. The flow in the experiments above was totally generated by a stretching sheet saturated in a quiescent fluid. [10] investigated boundary layer