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Abstract: This article addresses the magnetohydrodynamics (MHD) flow of a third grade fluid over an exponentially stretching sheet. Analysis is carried out in the presence of first order chemical reaction. Both cases of constructive and destructive chemical reactions are reported. Convergent solutions of the resulting differential systems are presented in series forms. Characteristics of various sundry parameters on the velocity, concentration, skin friction and local Sherwood number are analyzed and discussed.

Keywords: Chemical reaction; third grade fluid; exponentially stretching sheet; magnetic field.

Introduction

There are several materials like shampoos, muds, soaps, apple sauce, sugar solution, polymeric liquids, tomato paste, condensed milk, paints, blood at low shear rate which show the characteristics of non-Newtonian fluids. The behavior of such materials cannot be explored by a single constitutive relationship because of their diverse properties. Hence different fluid models are developed in the past to describe the exact nature of non-Newtonian materials. Third grade fluid is a subclass of differential type non-Newtonian fluid. This fluid model exhibits shear thickening and shear thinning characteristics. Some studies on the third grade fluid can be seen in