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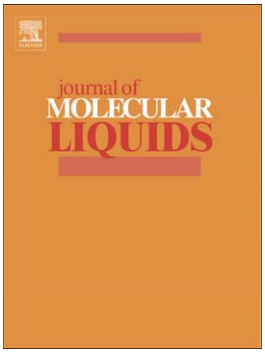

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On unsteady Falkner-Skan flow of MHD Carreau nanofluid past a static/moving wedge with convective surface condition

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Abstract: The aim of this article is to present the locally similar solutions for the unsteady two-dimensional Falkner-Skan flow of MHD Carreau nanofluid past a static/moving wedge in the presence of convective boundary condition. The effects of Brownian motion and thermophoresis are taken into account. The local similarity transformations are utilized to alter the leading time dependent non-linear partial differential equations to a set of ordinary differential equations. The obtained non-linear ordinary differential equations are solved numerically by the two different numerical techniques namely shooting method with Felhberg formula and Newton's Raphson as well as bvp4c function in MATLAB to explore the impacts of pertinent parameters. A comparison is presented between the current study and published works and found to be in outstanding agreement. It is important to mention that an increment in the wedge angle parameter depreciate the heat and mass transfer rate both for shear thinning and shear thickening fluids. Furthermore, the thermal boundary layer thickness is an increasing function of the generalized Biot number in shear thinning and shear thickening fluids. Additionally, temperature is enhanced by growing the Brownian motion and the thermophoresis parameters.

Keywords: Unsteady wedge flow, Carreau nanofluid, convective boundary condition, numerical solutions.

1 Introduction

The exploration of Falkner-Skan wedge flow is of vital importance in both theoretical and practical studies. Especially, such kind of flows happen frequently in packed bed reactor geothermal industries, enhanced oil recovery, ground water pollution, etc. A lot of literature regarding the Falkner-Skan wedge flow can be found in the books by Schlichting and Gersten

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