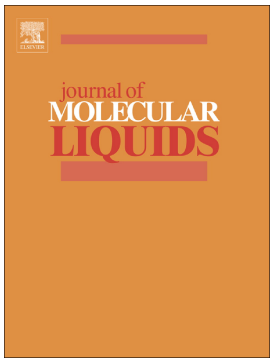

Semi analytical analysis for transient Eyring-Powell squeezing flow in a stretching channel due to magnetic field using DTM

Navid Balazadeh, M. Sheikholeslami, Davood Domairry Ganji, Zhixiong Li

PII: S0167-7322(18)30678-0
DOI: doi:10.1016/j.molliq.2018.03.066
Reference: MOLLIQ 8840

To appear in: *Journal of Molecular Liquids*

Received date: 6 February 2018
Revised date: 13 March 2018
Accepted date: 17 March 2018

Please cite this article as: Navid Balazadeh, M. Sheikholeslami, Davood Domairry Ganji, Zhixiong Li , Semi analytical analysis for transient Eyring-Powell squeezing flow in a stretching channel due to magnetic field using DTM. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), doi:10.1016/j.molliq.2018.03.066

Semi analytical analysis for transient Eyring-Powell squeezing flow in a stretching channel due to magnetic field using DTM

Navid Balazadeh [a], M. Sheikholeslami [a], Davood Domairry Ganji [a], Zhixiong Li [1,b,c]

[a] *Department of Mechanical Engineering, Babol Noshirvani University of Technology, P.O. Box 484, Babol, Iran*

[b] *School of Engineering, Ocean University of China, Qingdao 266110, China*

[c] *School of Mechanical, Materials, Mechatronic and Biomedical Engineering, University of Wollongong, Wollongong, NSW 2522, Australia*

Abstract

This paper deals with heat and mass transfer in unsteady two-dimensional MHD squeezing flow of Eyring-Powell fluid between two parallel infinite plates. Heat generation/absorption, thermal radiation and Joule heating influences are taken into consideration. The governing nonlinear PDEs are converted to nonlinear ODEs using similarity transformations. Analytical solution for the velocity, temperature and concentration distribution has been obtained by means of Differential Transformation Method (DTM).The comparisons between the results of DTM and numerical method (Runge-Kutta Fehlbrg), proved high precision of DTM. The effects of various parameters, including squeeze number, radiation parameter, heat generation/ absorption parameter and Hartmann number on the flow field, skin friction coefficient and heat transfer have been studied. The achieved results reveal that Lorentz force generated by magnetic field parameter (Ha), reduces velocity distribution. Also, it is found that the temperature profile reduces with the increase of radiation parameter (R).

Keywords: Eyring-Powell fluid; Magnetohydrodynamic (MHD); Thermal radiation; Stretching channel; Differential Transformation Method (DTM).

[1] Corresponding author:

Email: mohsen.sheikholeslami@nit.ac.ir (M. Sheikholeslami), G.Domairry@gmail.com (D.D. Ganji), zhixiongli@cumt.edu.cn (Zhixiong Li)