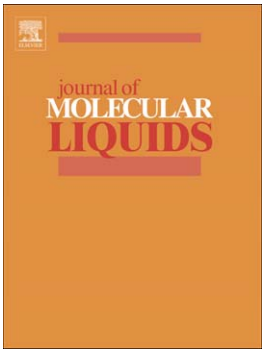

Convective flow of Jeffrey nanofluid due to two stretchable rotating disks

Tasawar Hayat, Mehwish Javed, Maria Imtiaz, Ahmed Alsaedi

PII: S0167-7322(16)34127-7
DOI: doi:10.1016/j.molliq.2017.05.024
Reference: MOLLIQ 7316

To appear in: *Journal of Molecular Liquids*

Received date: 19 December 2016
Revised date: 2 April 2017
Accepted date: 6 May 2017

Please cite this article as: Tasawar Hayat, Mehwish Javed, Maria Imtiaz, Ahmed Alsaedi, Convective flow of Jeffrey nanofluid due to two stretchable rotating disks, *Journal of Molecular Liquids* (2017), doi:10.1016/j.molliq.2017.05.024

Convective flow of Jeffrey nanofluid due to two stretchable rotating disks

Tasawar Hayat[a,b], Mehwish Javed[a], Maria Imtiaz[a,1] and Ahmed Alsaedi[b]

[a]Department of Mathematics, Quaid-I-Azam University 45320, Islamabad 44000, Pakistan

[b]Nonlinear Analysis and Applied Mathematics (NAAM) Research Group, Department of Mathematics, Faculty of Science, King Abdulaziz University, Jeddah 21589, Saudi Arabia

Abstract: Present analysis investigates the convective flow of Jeffrey nanofluid between two rotating stretchable disks. Effects of nanofluid flow are scrutinized with magnetohydrodynamics. Characteristics of heat transfer are examined in the presence of Joule heating. The relevant system is transformed to highly nonlinear ordinary differential equations by using suitable transformations. Graphical representation of convergent series solutions is obtained to analyze the results more efficiently. Influence of significant involved parameters on velocity, temperature and concentration is tested. Radial velocity profile has parabolic behavior for certain considered parameters. Effects of some relevant parameters on heat transfer rate are also tabulated. It is noted that heat transfer rate at lower disk rises for increasing Reynolds number and ratio of relaxation to retardation times.

Keywords: Jeffrey nanofluid; MHD; Convective boundary conditions; Two rotating stretchable disks.

1 Introduction

Non-Newtonian fluids have numerous applications in food processing, lubricants, manufacturing of paints, emulsions, polymers and certain other liquids. Generally there are three classes of non-Newtonian fluids i.e. integral, differential and rate type fluids. The later type of fluid shows the behavior of relaxation and retardation times. Jeffrey fluid is one of the rate type fluid indicating the viscoelasticity effects. Few investigators $[1-6]$ already examined the rheological aspects employing various fluid models.

Nanofluid is comparatively a newly recognized class of fluids containing base fluid with particles of nano-size. Recent study of nanofluids reveals that the fluid has absolutely different characteristics with the nanoparticle mixture because the thermal conductivity of the base fluid is smaller than the nanoparticle's thermal conductivity. Nanotechnology is b eing

[1]Corresponding author Tel.: +92 51 90642172.

Email address: mi_qau@yahoo.com