

## Accepted Manuscript

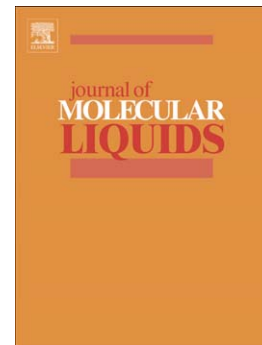
Viscous dissipation effect in flow of magnetonano fluid with variable properties

T. Hayat, M. Ijaz Khan, M. Waqas, T. Yasmeen, A. Alsaedi

PII: S0167-7322(16)31434-9  
DOI: doi: [10.1016/j.molliq.2016.06.096](https://doi.org/10.1016/j.molliq.2016.06.096)  
Reference: MOLLIQ 6003

To appear in: *Journal of Molecular Liquids*

Received date: 5 June 2016  
Accepted date: 27 June 2016



Please cite this article as: T. Hayat, M. Ijaz Khan, M. Waqas, T. Yasmeen, A. Alsaedi, Viscous dissipation effect in flow of magnetonano fluid with variable properties, *Journal of Molecular Liquids* (2016), doi: [10.1016/j.molliq.2016.06.096](https://doi.org/10.1016/j.molliq.2016.06.096)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

*Viscous dissipation effect in flow of magnetonano fluid with variable properties*

T. Hayat<sup>a,b</sup>, M. Ijaz Khan<sup>a</sup>, M. Waqas<sup>a</sup>, T. Yasmeen<sup>c,d,\*</sup> and A. Alsaedi<sup>b</sup>

<sup>a</sup>Department of Mathematics, Quaid-I-Azam University 45320, Islamabad 44000, Pakistan

<sup>b</sup>Nonlinear Analysis and Applied Mathematics (NAAM) Research Group, *Department of Mathematics, Faculty of Science, King Abdulaziz University, P. O. Box 80257, Jeddah 21589, Saudi Arabia*

<sup>c</sup>Department of Mechanical Engineering, Imperial College London, London SW7 2AZ, United Kingdom

<sup>d</sup>Department of Mechanical Engineering, University of Engineering & Technology Peshawar, Pakistan.

(\* Corresponding author Email: [tabassum.mechanical@gmail.com](mailto:tabassum.mechanical@gmail.com), [t.yasmeen16@imperial.ac.uk](mailto:t.yasmeen16@imperial.ac.uk))

**Abstract:** This investigation addresses the mixed convection flow of Casson fluid with magnetic field and temperature-dependent thermal conductivity. The flow is caused by a stretching cylinder. Brownian motion and thermophoresis effects in the nanofluid model are employed. Heat transfer is studied in presence of viscous dissipation. The modeled nonlinear partial differential equations are reduced to nonlinear ordinary differential equations by employing suitable transformation. The resulting equations are solved by using homotopic procedure. Graphs are plotted to analyze the characteristics of several sundry parameters on velocity, temperature and nanoparticles concentration. Besides these the numerical values of skin friction coefficient, local Nusselt and Sherwood numbers are computed and analyzed. It is noted that the behaviors of Brownian motion and thermophoretic parameters on the nanoparticles concentration field are quite reverse.

**Keywords:** Casson fluid, magnetic nanoparticles; temperature-dependent thermal conductivity, viscous dissipation; stretching cylinder.

**Introduction**

The nanofluids in perspective of the remarkable thermal conductivity enhancement have been acknowledged valuable in numerous engineering and industrial applications. One of the technological utilizations of nanoparticles that hold huge guarantee is the utilization of heat transfer liquids containing suspensions of nanoparticles to go up against cooling issues in the

Download English Version:

<https://daneshyari.com/en/article/5409863>

Download Persian Version:

<https://daneshyari.com/article/5409863>

[Daneshyari.com](https://daneshyari.com)