

Accepted Manuscript

Research articles

Impact of induced magnetic field on Synovial fluid with peristaltic flow in an asymmetric channel

AmbreenAfsar Khan, Arfa Farooq, Kambiz Vafai

PII: S0304-8853(17)30946-0

DOI: <http://dx.doi.org/10.1016/j.jmmm.2017.08.092>

Reference: MAGMA 63126

To appear in: *Journal of Magnetism and Magnetic Materials*

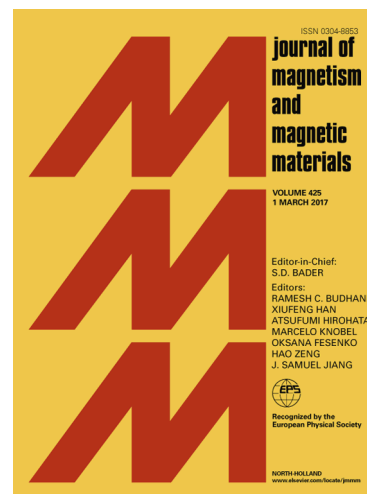
Received Date: 21 March 2017

Revised Date: 12 July 2017

Accepted Date: 25 August 2017

Please cite this article as: A. Khan, A. Farooq, K. Vafai, Impact of induced magnetic field on Synovial fluid with peristaltic flow in an asymmetric channel, *Journal of Magnetism and Magnetic Materials* (2017), doi: <http://dx.doi.org/10.1016/j.jmmm.2017.08.092>

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.



Impact of induced magnetic field on Synovial fluid with peristaltic flow in an asymmetric channel

AmbreenAfsar Khan¹, Arfa Farooq¹, Kambiz Vafai²

¹Department of Mathematics and Statistics, International Islamic University Islamabad, 44000.

²Department of Mechanical Engineering, University of California Riverside, USA.

ambreen.afsar@iiu.edu.pk, arfaf09@gmail.com, vafai@engr.ucr.edu

ABSTRACT

In this paper, we have worked for the impact of induced magnetic field on peristaltic motion of a non-Newtonian, incompressible, synovial fluid in an asymmetric channel. We have solved the problem for two models, Model-1 which behaves as shear thinning fluid and Model-2 which behaves as shear thickening fluid. The problem is solved by using modified Adomian Decomposition method. It has seen that two models behave quite opposite to each other for some parameters. The impact of various parameters on u , $\frac{dp}{dx}$, Δp and induced magnetic field b_x have been studied graphically. The significant findings of this study is that the size of the trapped bolus, the pressure gradient and velocity increases by increasing M for both models.

Key Words: Synovial fluid, Peristaltic flow, Induced magnetic field, Asymmetric channel.

INTRODUCTION

Peristaltic flow is one of the most important flows in recent research. It has application in many fields of biology, engineering and physiology. It appears in the function of kidney to bladder, in digestive system where the smooth muscles expand and contract to move the food, vasomotion of small blood vessels, chime movement in the gastro-intestinal tract, finger and roller pump, sanitary fluid transport, in cell separator, and heart-lung machine. Moreover in engineering, peristaltic flow has numerous applications, involving in the transfer of chemicals, transport of slurries fluid, pharmaceutical and noxious fluids etc. Keeping in view of its importance various authors [1-4] have discussed peristaltic in mechanical and biological situations.

Synovial fluid is a biomedical fluid which is found in the cavities of joints. It has a very low coefficient of friction. It has egg white like consistency and color for a normal healthy joint. The function of synovial fluid is to reduce friction between the joints during movement. Its mathematical model was given by Horn et al. [5]. Voet and Voet [6] showed that the most

Download English Version:

<https://daneshyari.com/en/article/5489974>

Download Persian Version:

<https://daneshyari.com/article/5489974>

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