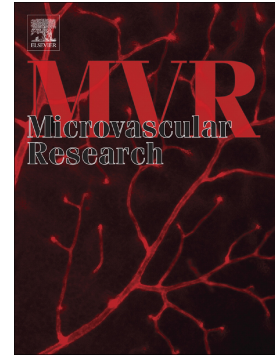


Accepted Manuscript

Numerical simulation of heat transfer in blood flow altered by electroosmosis through tapered micro-vessels

J. Prakash, K. Ramesh, D. Tripathi, R. Kumar



PII: S0026-2862(18)30014-1
DOI: doi:[10.1016/j.mvr.2018.03.009](https://doi.org/10.1016/j.mvr.2018.03.009)
Reference: YMVRE 3776
To appear in: *Microvascular Research*

Please cite this article as: J. Prakash, K. Ramesh, D. Tripathi, R. Kumar , Numerical simulation of heat transfer in blood flow altered by electroosmosis through tapered micro-vessels. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Ymvre(2017), doi:[10.1016/j.mvr.2018.03.009](https://doi.org/10.1016/j.mvr.2018.03.009)

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.

Numerical simulation of heat transfer in blood flow altered by electroosmosis through tapered micro-vessels

¹J. Prakash, ²K. Ramesh, ^{#3}D Tripathi and ³R Kumar

¹Department of Mathematics, Agni College of Technology, Thalambur, Chennai- 600120, Tamilnadu, India

²Department of Mathematics, Lovely Professional University, Jalandhar-144411, Punjab, India

³Department of Mechanical Engineering, Manipal University Jaipur-303007, Rajasthan, India

Abstract:

A numerical simulation is presented to study the heat and flow characteristics of blood flow altered by electroosmosis through the tapered micro-vessels. Blood is assumed as non-Newtonian (micropolar) nanofluids. The flow regime is considered as asymmetric diverging (tapered) microchannel for more realistic micro-vessels which is produced by choosing the peristaltic wave train on the walls to have different amplitudes and phase. The Rosseland approximation is employed to model the radiation heat transfer and temperatures of the walls are presumed constants. The mathematical formulation of the present problem is simplified under the long-wavelength, low-Reynolds number and Debye-Hückel linearization approximations. The influence of various dominant physical parameters are discussed for axial velocity, microrotation distribution, thermal temperature distribution and nanoparticle volume fraction field. However, our foremost emphasis is to determine the effects of thermal radiation and coupling number on the axial velocity and microrotation distribution beneath electroosmotic environment. This analysis places a significant observation on the thermal radiation and coupling number which plays an influential role in hearten fluid velocity. This study is encouraged by exploring the nanofluid-dynamics in peristaltic transport as symbolized by heat transport in biological flows and also in novel pharmacodynamics pumps and gastro-intestinal motility enhancement.

Keywords: *Electroosmosis; Peristalsis; Hemodynamics; Nanofluids; Micropolar fluids; ND Mathematica Simulation.*

1. Introduction

Electroosmosis is a mechanism in which ions are transported with ionic liquids through the microchannel and capillary under the influence of applied electric field. With an emerging application of electroosmosis for biomicrofluidics (Edwards IV et al., 2007; Wang et al., 2009;

Download English Version:

<https://daneshyari.com/en/article/8340896>

Download Persian Version:

<https://daneshyari.com/article/8340896>

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