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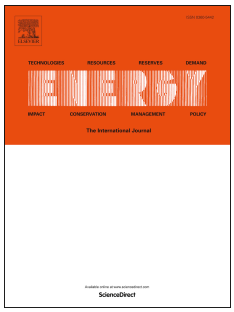

Entropy generation on electro-osmotic flow pumping by a uniform peristaltic wave under magnetic environment

N.K. Ranjit, G.C. Shit

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Entropy generation on electro-osmotic flow pumping by a uniform peristaltic wave under magnetic environment

N. K. Ranjit, G. C. Shit*

Department of Mathematics, Jadavpur University, Kolkata - 700032, India.
**Corresponding Author. Email: gcs@math.jdvu.ac.in (G. C. Shit), Tel. Phone: +91 33 2457 2716*

Abstract

The entropy generation in a narrow fluidic channel induced by a uniform peristaltic wave under electrokinetic force and magnetic field is investigated. The governing equations for electromagnetohydrodynamic problem are simplified under the framework of Debye-Hückel linearization approximation as well as the long wave length and low Reynolds number assumptions. The heat transfer characteristic in a microfluidic device is analyzed in the presence of Joule heating effects and viscous dissipation due to fluid friction and magnetic field formalism using thermal boundary conditions. The analytical expression for axial velocity, temperature, pressure distribution, the Nusselt number and Bejan number have been estimated and their numerical solutions appraised for diverse values of the parameters approaching into the problem. The study puts forward an important observation that the entropy generation number attains maximum value in the region close to the walls of the channel, while it gains minimum value near the central region of the channel. The overall pumping performance can be enhanced with suitably adjusting magnetic field strength.

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