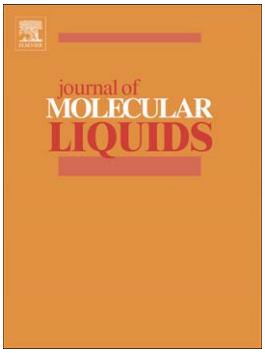

Stimulation of metallic nanoparticles under the impact of radial magnetic field through eccentric cylinders: A useful application in biomedicine

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Stimulation of metallic nanoparticles under the impact of radial magnetic field through eccentric cylinders: A useful application in biomedicine

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Abstract: This paper represents a new model of magnetohydrodynamic (MHD) peristaltic flow of nanofluid by considering the blood as the base fluid and copper and silver as the nanoparticles through eccentric annuli. An appropriate model of peristaltic pumping is introduced and it is encouraged due to the fact that thread infusion within the human body is a promising strategy for setting medical implants with least surgical trauma. The central cylinder is rigid and moving with consistent velocity V while the outlying tube has a sinusoidal wave going down through its wall. A magnetic field is imposed in radial direction to enhance the amplitude of wave (for synchronization avail in ECG). The complicated flow model equations are first simplified under the assumptions of long wavelength and low Reynolds number. Then series solutions are obtained for resulting system. The innovation with distinct sundry parameters are discussed via graphical illustrations. Comparison among the pure blood, silver blood and copper blood is presented and analyzed. It is also revealed that inclusion of nanoparticles enlarge the velocity of fluid.

Keywords: Peristaltic flow, Cu and Ag nanoparticles, Radial magnetic field, Eccentric cylinders, Analytical series solution.

1 Introduction

Endoscope and catheter are very vital apparatuses for medical analysis and they have numerous clinical applications. The endoscope now is a very important tool used for determining real reasons responsible for many problems in the human organs in which the fluid are transported by peristaltic pumping such as, small intestine, stomach, etc. Likewise from fluid dynamic perspective, there is no contrast between an endoscope and catheter. In medicine, a catheter is a tube that can be embedded into a body cavity, channel or vessel. Catheters thereby allow drainage or infusion of fluids. The way toward embedding a catheter is catheterization.

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