

Effect of Nanoparticle Size on Its Dispersion in Capillaries Using Power Law Nanofluid Model

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ABSTRACT

This paper gives the analysis of dispersion of nanoparticles in blood capillaries linked to nanodrug delivery systems. Nanoparticles dispersed in blood capillaries have been identified as nanofluids. The viscosity of nanofluid is modelled using the nanoparticle size dependent viscosity relation. The properties of blood are studied using power law fluid, owing to their physically correct simulations. The mathematical model is framed using Navier-Stokes equation and concentration diffusion equation. The dispersion model framed here has been solved applying the method of moments. The value of nanofluid temperature and velocity has been found using the finite difference method. The study conducted gives an insight into temperature, velocity and concentration of nanoparticles dispersed in blood with respect to various parameters like size, volume fraction of nanoparticles and power law index. Graphs have been plotted using MATLAB. The above model has useful applications to understand the dispersion of nanodrugs in the treatment of cardio vascular diseases.

Keywords: Nanoparticle, Dispersion, Nanofluid, Nanoparticle size, Power-Law

