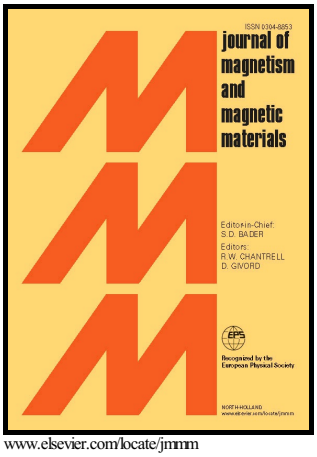

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Hall and ion slip effects on peristaltic flow of Jeffrey nanofluid with Joule heating

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Abstract: This paper addresses mixed convective peristaltic flow of Jeffrey nanofluid in a channel with complaint walls. The present investigation includes the viscous dissipation, thermal radiation and Joule heating. Hall and ion slip effects are also taken into account. Related problems through long wavelength and low Reynolds number are examined for stream function, temperature and concentration. Impacts of thermal radiation, Hartman number, Brownian motion parameter, thermophoresis, Joule heating, Hall and ion slip parameters are investigated in detail. It is observed that velocity increases and temperature decreases with Hall and ion slip parameters. Further the thermal radiation on temperature has qualitatively similar role to that of Hall and ion slip effects.

Keywords: Jeffrey nanofluid, Mixed convection, Joule heating, Thermal radiation, Hall and ion slip, Compliant walls.

1 Introduction

Peristalsis is a mechanism which occurs due to contraction and expansion of flexible walls. In other words this activity includes passing down, mixing and transporting materials through contraction or expansion of the waves propagating along the channel walls. It has wide applications in medical industry, chemical and physiological processes and industries. Some examples include distillation towers, fixed-bed reactors, urine transport from kidney to bladder through the ureter, transport of lymph in the lymphatic vessels, bile movement in bile duct, swallowing food through the esophagus, the movement of chyme in the gastrointestinal tract, ovum movement in the fallopian tube, transport of corrosive fluids, sanitary fluid transport, blood pumps in heart lung machine and locomotion of worms etc. Latham [1] at first explored peristaltic activity through experiments. Shapiro et al. [2] extended experi-

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