Peristaltic Flow of a Jeffrey Fluid with Variable Viscosity in an Asymmetric Channel

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In this article, we have considered incompressible Jeffrey fluids and studied the effects of variable viscosity in the form of a well-known Reynold's model of viscosity in an asymmetric channel. The fluid viscosity is assumed to vary as an exponential function of temperature. The governing fundamental equations are approximated under the assumption of long wavelength and low Reynold number. The governing momentum and energy equations are solved using regular perturbation in terms of a small viscosity parameter β to obtain the expressions for stream functions pressure rise and temperature field. Numerical results are obtained for different values of viscosity parameter β, channel width d, wave amplitude b, and Jeffrey parameter λ_1. It is observed that the behaviour of the physical parameters λ_1, β, and d on pressure rise versus flow rate is as follows: when we increase these parameters pressure rise decreases while pressure rise increases with the increase in b. It is also observed that temperature profile increases when we increase E_c, P_r, and β. Trapping phenomena are also discussed at the end of the article to see the behaviour of different parameters on streamlines.

Key words: Peristaltic Flow; Jeffrey Fluid; Variable Viscosity; Heat Transfer; Reynold's Model.