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PERISTALTIC TRANSPORT OF A CONDUCTING BINGHAM FLUID IN A CHANNEL

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Abstract

In this paper peristaltic transport of a conducting Bingham fluid in a channel under long wavelength and low Reynolds number assumptions is studied. This model is probably suitable for the blood flow in the sense that erythrocytes region and the plasma regions may be described as plug flow and non-plug flow regions. In this experiment, peristaltic transport of a Bingham fluid is studied extensively.

Consider the peristaltic pumping of a conducting Bingham fluid in a channel of half-width. A longitudinal train of progressive sinusoidal waves takes place on the upper and lower walls of the channel. For simplicity, we restrict our discussion to the half width of the channel.

It is observed that for a Bingham fluid the pressure difference and the mechanical efficiency of pumping depend on the yield stress and the magnetic field. Frictional forces increases with decrease in yield stress and mechanical efficiency decreases with increase in yield stress. The pressure difference decreases with increase in yield stress. The pressure rise increases with amplitude ratio and magnetic field.