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Steady Flow of Couple Stress Fluid through a Rectangular Channel Under Transverse Magnetic Field

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Abstract

In this paper, we have considered the steady and an incompressible conducting couple stress fluid flow in the presence of transverse magnetic field through a rectangular channel with uniform cross–section. The induced magnetic field is neglected. We consider the case that there is no externally applied electric field. Under these conditions, we get 4^{th} order PDE for velocity w along the axis of the rectangular tube. The usual no slip and hyper stick boundary conditions are used to obtain the solution for w. We obtained the velocity w in terms of Fourier series. Skin friction on the walls and volumetric flow rate are obtained in terms of physical parameters like couple stress parameter and Hartmann number. The effects of these parameters on skin friction and volumetric flow rate are studied through graphs.