Effects of Variable Viscosity and Thermal Conductivity on Stagnation Point Flow and Heat Transfer of a Micropolar Fluid Towards a Vertical Permeable Surface

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Abstract: In this study the steady stagnation point flow of a micropolar fluid towards a vertical permeable surface is investigated when the viscosity and thermal conductivity are assumed to vary with temperature. The free stream velocity and the surface temperature of the plate are assumed to vary linearly with the distance from the stagnation point and the external force impinges normal to the heated plate. The partial differential equations governing the problem under consideration have been transformed into a system of non-linear ordinary differential equations by the similarity transformation and solved them numerically by shooting method. Numerical results are carried out for various non-dimension parameters especially variable viscosity, thermal conductivity and microrotation parameters and results are shown graphically. The results show the parameters which have significant influences on velocity, microrotation and temperature distributions.

Keywords: Micropolar fluid, stagnation point flow, permeable surface, viscosity and thermal conductivity, shooting technique.

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