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UNSTEADY FLOW OF DUSTY MAGNETIC CONDUCTING COUPLE STRESS FLUID THROUGH A PIPE

V. P. RATHOD[1] AND SYEDA RASHEEDA PARVEEN[2]
[1] Department of Mathematics, CNCS,
Haramaya University, Ethiopia
[2] Department of studies and Research in Mathematics,
Gulbarga University, Gulbarga-585106, Karnataka, India

Abstract

The unsteady flow of a dusty viscous incompressible conducting couple stress fluid through a circular pipe is investigated. A constant pressure gradient in the axial direction and a uniform magnetic field perpendicular to the flow direction are applied. The particle phase is assumed to behave as a viscous fluid. A numerical solution is obtained for the governing nonlinear momentum equations using transformation technique (cosine, Hankle transformation). The effects of the magnetic field parameter Ho, the couple stress fluid characteristics and the particle-phase viscosity on the transient behavior of the velocity, volumetric flow rates, skin friction coefficients of both fluid and particle phases have been studied. It is found that all the flow parameters for both phase's decreases as the magnetic field increases or the flow index decreases.
