FORCED FLOW OF A CONDUCTING VISCOUS FLUID THROUGH A POROUS MEDIUM INDUCED BY A ROTATING DISK WITH APPLIED MAGNETIC FIELD

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S u m m a r y

We study the forced flow of an electrically conducting viscous incompressible fluid bounded by the porous medium and an infinite impervious rotating disk. A uniform magnetic field is applied in the direction normal to the flow. It is assumed that the flow between the disk and the porous medium is governed by the Navier–Stokes equations and that in the porous medium by the Brinkman equations. The flows in the two regions are matched at the interface by assuming that the velocity and stress components are continuous at it. At the interface (the boundary between the porous medium and the clear fluid), a modified set of boundary conditions suggested by Ochao–Tapia and Whittaker is used. The analytic expressions for the velocity and the shearing stress are obtained, and the effects of various parameters on them are examined.