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CONTENTS

Abstract: This paper deals with the flow of a Viscous, Incompressible and electrically conducting fluid past axisymmetric bodies in which the uniform ambient flow field is collinear with theuniform magnetic field. The result of *K.* Gotoh[1] for a sphere are generalized to apply to all ellipsoids of revolution, i.e. both prolate andoblate, and a special case of the disc (circular) has also been found. Detailed theoretical discussion has been studied on the steady flow by making use of the Oseen's approximation.

The drag Coefficient has been found to the first order approximation in terms of parameters R, R_m and M - the Reynols number, the Magnetic Reynolds number and the Hartmann's number respectively. It is found that if $M^2 < RR_m$, there is no effect on the Oseen's value of the drag and if $M^2 > RR_m$, the drag increases with the strength of the applied magnetic field and the conductivity of the fluid as has been found in the case of the sphere by Ludford.[2] Further, it is also found that the drag coeeficent is continuous at $S = 1(S = \mu H_0^2/4\pi\rho U^2 = M^2/RR_m)$, whereas it changes abruptly in the two-dimensional case as found by Yosinobu and Kakutani.[3]

Abstract: General equations for the torsion of a cylinder of piezoelectric β-quartz have been deduced by introducing the torsion function and the electric potential. By the application of suitable electric fields, solutions have been obtained for circular, elliptic and rectangular cross-section of the cylinder.

Summary: The stresses and deformations in the non-dissipative poro-elastic half space under periodic surface loads have been investivagated. Only irrotational deformations and a special type of loading have been considered.

Abstract: Invariance of the two-component neutrino wave equation under finite conformal coordinate transformations have been examined. It is shown that it is not possible to mix the wave function with its complex conjugate. Agreement with the results of infinitesimal transformations(Vachaspati, 1960) and the four-component equation (Rastogi, 1962) is found.

Abstract: This paper deals with spherical and circular inclusion problem in an elasto-plastic material. Strains are supposed to be infinitesimal. The results are compared when the outer material is purely elastic.

Summary: Aerodynamic characteristics of the subsonic flow past a cascade of aerofoils are obtained in this paper by using the singularity-distribution method. The perturbation velocity potential of a vortex is derived from that of a dipole moving uniformly in a compressible fluid. Even though the results obtained are applicable to aerofoils of small camber, it is indicated how the theory can be extended to aerofoils of large camber from the designer's point of view.

Abstract: The secondary flow of non-Newtonian fluids whose constitutive equation is given by

$$T = -pI + \Phi_1 A + \Phi_2 B + \Phi_3 A^2,$$

where Φ_1, Φ_2, Φ_3 are respectively the coefficients of Newtonian viscosity, visco-elasticity and cross-viscosity and A and B are the velocity and acceleration gradient tensors, induced between two concentric spheres of radii ka and $a(0 < k < 1)$ rotating about an axis withangular velocities $m\Omega$ and Ω, has been investigated. Effects of inertial terms, cross-viscosity and visco-elasticity are studied throuh the parameters $R = a^2\Omega\rho/\Phi_1, S = \Phi_3\Omega/\Phi_1$, and $k = \Phi_2\Omega/\Phi_1$, treated as small. For a Newtonian fluid the meridian section is divided into four quadrants by the axis of rotation and equator and the secondary flow consists of closed loops, the sense being the same in the diagonally opposite quadrants and opposite in the adjacentquadrants. For small values of S and k depending on R and m, the measure of relative rotation of the spheres, the flow field in each quadrant is further divided into two regions with closed loops in each region having the opposite sense. In general the sense of secondary motion depends on the relative rotation of the spheres and the values of the parameters S and k. The effects of cross-viscosity and visco-elasticity on the stresses exerted by the fluid on the surfaces have also been evaluated.

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Summary: A solution of the Fickian equation of diffusion is obtained for the case of an instantaneous point source released at a given height from the ground. The coefficients of lateral diffussion in the vertical direction is assumed to vary as a power of height. The atmosphere is taken to have a uniform mean speed.

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