ABSTRACTS OF PAPERS

ACCEPTED FOR PUBLICATION

A NOTE ON A CLASS OF STARLIKE FUNCTIONS

by S. K. Bajpai

In this note a sharp radius of convexity bound for the class S_δ, of normalized, regular and univalent functions which satisfy $\left|\frac{zf'(z)}{f(z)} - 1\right| \leqslant 1-\delta;\ 0 < \delta < 1$, has been obtained.

STEADY FLOW OF DIPOLAR FLUIDS BETWEEN TWO INFINITE DISKS ONE ROTATING AND THE OTHER AT REST

by K. N. Katyal

The three-dimensional steady flow of an incompressible dipolar fluid between two infinite disks, one rotating in its own plane with a uniform angular velocity Ω and the other at rest, is considered. Due to the complicated nature of the governing equations, the solutions presented are approximate, being valid for small values of the Reynolds number $R = \Omega\lambda^2/\nu$ where λ is the distance between the disks and ν the kinematic viscosity. The influence of the material constants characterizing the fluid on the velocity field and the stresses at the disks is studied.

OSCILLATORY FLOWS OF DIPOLAR FLUIDS

by K. N. Katyal

Propagation of finite amplitude waves in a dipolar fluid due to the forced oscillations of an infinite plate is studied. It is found that in general the velocity function consists of two wave-modes. The effect on the damping distance and the wave speed of the various parameters characterizing the fluid is studied in a few limiting cases.

FREE CONVECTION ALONG A HORIZONTAL PLATE

by T. Govindarajulu

The free convection on a non-isothermal horizontal plate subject to a uniform suction is studied. Similarity solutions are obtained using an approximate method due to Fettis (1955). The effect of suction and the Prandtl number on the flow and heat characteristics is analysed. It is found that the influence of suction is more pronounced on shear stress than on heat transfer for fluids of Prandtl number $P_r < 0{\cdot}73$ and for $P_r > 0{\cdot}73$ it is the other way about.

UNIVERSAL STABILITY OF HYDROMAGNETIC CONVECTIVE FLOWS IN A POROUS MEDIUM

by N. Rudraiah

The linear and non-linear stability of a conducting convective flow of a fluid in a porous medium is investigated. Our analysis is restricted to Darcy's law, small magnetic Reynolds number and Boussinesq approximation.

In the case of linear theory the condition for marginal stability is obtained in terms of the Rayleigh number R_a, wavenumber a and the Hartmann number M; the criterion for the convective flow is given. A marginal stability curve is drawn. It is shown that the magnetic field inhibits the onset of convection.

In the case of non-linear theory a universal stability estimate, namely a stability limit for motions subject to arbitrary non-linear disturbances, is obtained in terms of Rayleigh number R_a, Reynolds number R_e and Hartmann number M for the flow. The existence of an open region of certain stability near the origin of the (R_a, R_e) Cartesian plane for a fixed M is drawn. The universal stability limit can then be improved by suitably defining a maximum problem using variational techniques. It is found that, as in the case of linear theory, the magnetic field inhibits the onset of convection. It is also shown that the effect of non-linear disturbances is to reduce the critical Rayleigh number by an amount of R_e compared to that of the linear theory.

ASYMMETRIC DISTRIBUTION OF STRESS IN A THICK PLATE CONTAINING A PENNY-SHAPED CRACK

by G. K. Dhawan

A solution is derived of the equations of equilibrium appropriate to the application of pressure to the faces of a plane crack in an elastic plate of finite thickness. The solution corresponding to a particular type of loading of the crack is deduced and expressions for quantities of physical interest are obtained for small values of the ratio of the radius of the crack to that of its distance from the free boundary by finding iterative solution.

PLANE WAVES IN GENERALIZED THEORY OF THERMOELASTICITY

by M. C. Wadhawan

In this paper, the properties of plane harmonic waves have been studied using the generalized theory of thermoelasticity. The known results have been modified by introducing the time needed for the acceleration of the heat flow.

CERTAIN SPECIAL FEATURES OF THE GRAVITATIONAL METRIC OF SPHERICAL SYMMETRY AND GEODESIC TYPE

by P. P. Kale

Perfect fluid distributions with spherical symmetry are discussed with the metric of the form $ds^2 = d\tau^2 - X^2(\rho, \tau)\, d\rho^2 - Y^2(\rho, \tau)\, d\Omega^2$. It is shown that if $X = \partial Y/\partial\rho$, only a de Sitter type solution is possible while, if $X = \partial Y/\partial\rho/\sqrt{n+(\partial Y/\partial\tau)^2}$, physically possible perfect fluid distributions exist with the invariant $I = 0$. Further a transform of Schwarzschild's interior solution into the geodesic form is given, as a sequel to the transform of Schwarzschild's external solution in the geodesic form, already known.