

**ABSTRACTS OF PAPERS
ACCEPTED FOR PUBLICATION**

**THE ISOTHERMAL EXPANSION OF A SPHERICAL
CYLINDRICAL AND PLANE PISTON INTO AN
INHOMOGENEOUS MEDIUM**

by S. ASHRAF

In this paper we have obtained approximate analytic solutions, describing the uniform motion of a spherical, cylindrical or plane piston into a non-uniform medium in which the density $\rho_0 \propto x^{-\alpha}$, where x is the distance measured from the point or axis of symmetry and α is a positive constant. We have assumed that the flow is isothermal in the entire region behind the shock. We have used the modified form of Chernyi's technique in which the flow variables are expanded in series of powers of $1/M^2$ where M is the Mach number of the shock. Comparison of our analytic solution with exact numerical results of Rogers shows an excellent agreement even up to shock Mach number equal to 1.5.

**ON THE APPLICATION OF TRANSFORMS FOR COMPUTATION
OF INTEGRALS INVOLVING LEGENDRE'S FUNCTION**

by R. S. DAHIYA

The present paper deals with the application of various transforms simultaneously to the evaluation of integrals of one and two variables that involve Legendre function of the first kind. The integrals of the theory of the present transform offers gains simplicity and as well as new generalizations.

**SECONDARY FLOW CAUSED BY THE ROTATION OF A
SPHERE IN FLUIDS WITH COUPLE STRESSES**

by GIRIJA DEVI

In the present paper, we have made a study of the secondary flow caused by the rotation of a sphere about a diameter in fluids with couple stresses. We have compared the flow with the flows in other non-polar fluids. It is observed that the streamlines representing the Newtonian fluid are displaced away from the sphere when compared with the corresponding streamlines for the fluids with couple stresses. No typical non-Newtonian effect is observed.

ON A PROPERTY OF THE GENERALIZED HANKEL TRANSFORM

by S. MASOOD

In the present paper, by employing the results of Masood and Kapoor (1968, 1972), we have proved the following which embraces the two earlier results due to Narsimha Rao (1959) and Narain (1959): Theorem: The integral of the product of two functions self-reciprocal for one kernel equals the integral of the product of two other functions self-reciprocal for another kernel, provided that (i) one function in each product is the generalized Laplace transform of a function of the other product, and (ii) the integrals involved converge absolutely.

ON SOME FURTHER APPLICATIONS OF THE VARIATIONAL FORMULATION BASED ON LOCAL POTENTIAL TO THE SOLUTION OF DIFFUSION EQUATION

II. HEAT CONDUCTION IN AN ABLATING SOLID WITH VARIABLE THERMAL PROPERTIES

by L. N. GUPTA

The solution for the heat conduction problem in an ablating solid with variable thermal properties and with a very general law of variation of thermal conductivity is obtained by the variational method based on the concept of local potential. The results for alumina obtained by Biot and Agrawal (1964) follow as a particular case and the need to evaluate certain integrals numerically is avoided. Solution for the case when the temperature dependence of the thermal properties is neglected has also been derived and compared with the exact solution of the problem given by Landau (1950).

ON THE MECHANICAL RESPONSE IN A PRE-ENERGIZED INHOMOGENEOUS PIEZOELECTRIC TRANSDUCER

by ASHIS KUMAR PAL

In this paper the mechanical response of a pre-energized inhomogeneous piezoelectric transducer has been evaluated for three particular variants. The inhomogeneity is taken in the sense used by Redwood and Mitchell (1968).

ON THE OSCILLATIONS OF AN ELLIPTIC CYLINDER CONTAINED IN A VISCOUS LIQUID BOUNDED BY A CONFOCAL COAXIAL ELLIPTIC CYLINDER WITH SUCTION AND INJECTION

by M. L. RAWAT

The flow caused in a viscous liquid contained between two coaxial elliptic cylinders due to the oscillations of the inner cylinder has been discussed.

The solutions have been obtained in terms of the Mathieu functions $ce_{2n}(\eta, q)$ of the even integral order and the modified Mathieu functions $Ce_{2n-\beta_{2n}}(\xi, q)$ and $Se_{2n+\beta_{2n}}(\xi, q)$ of the non-integral order. The condition of wall porosity is assumed in the form of flux through one wall equal to the efflux through the other wall. The results hold for the value of the suction parameter $\frac{cf_0}{v}$ less than 2. The flow in the extreme cases of very large and very small frequencies has been deduced. If the fundamental ellipse of the cross-section of the tubes be made to tend to a circle, the limiting form of the results gives the flow between two coaxial circular cylinders.

EFFECT OF A GRIFFITH CRACK ON THE DISTRIBUTION OF STRESS IN A SEMI-INFINITE TWO-DIMENSIONAL MEDIUM

by G. K. DHAWAN

The paper contains the analysis of the ratio of the internal pressure on the two surfaces of the Griffith crack situated parallel to the free boundary when the crack is not dislocated from its original position. It is assumed that the free boundary is stress-free. By using the Fourier transforms and the theory of dual integral equations, problem is reduced to the solution of a pair of simultaneous Fredholm integral equation of second kind. Expression for normal displacement and ratio of the pressures applied are derived for small value of the ratio of the radius of the crack to that of its distance from the free boundary by finding iterative solution of these equations. Finally, for values of the ratio near unity, simultaneous Fredholm equations have been solved numerically.

A COUPLED THERMO-ELASTIC PROBLEM OF A HALF-SPACE UNDER THE ACTION OF A THERMAL SHOCK ON THE BOUNDING SURFACE

by SNEHANSHU KUMAR ROY CHOUDHURI

The theory of coupled thermo-elasticity is applied to solve the problem of determination of the distribution of temperature and the thermo-elastic deformation in a half-space under the action of a thermal shock on the bounding surface. The perturbation method is used. The perturbation function for temperature is seen to vanish initially. The surface displacement has been calculated for small values of time and also a graphical representation is presented.

ON ALMOST PRODUCT AND ALMOST DECOMPOSABLE MANIFOLDS

by R. S. MISHRA, F.N.A., and R. D. S. KUSHWAHA

In this paper the authors have obtained some properties of almost product, and almost decomposable manifolds and some theorems on curvature tensors.

HYDROMAGNETIC FLOW OF AN ELECTRICALLY CONDUCTING FLUID DUE TO UNSTEADY ROTATION OF A POROUS DISK OVER A FIXED DISK

by MOHD. ABDUL ALEEM KHAN

The unsteady hydromagnetic flow of a viscous, incompressible and electrically conducting fluid due to rotatory vibrations of a porous disk about a constant non-zero mean over a fixed disk has been analysed. The fixed disk is supposed to be non-porous and the angular velocity of the other disk which is porous is assumed to consist of basic steady distribution together with a time varying distribution.

ON SOME FURTHER APPLICATIONS OF THE VARIATIONAL FORMULATION BASED ON LOCAL POTENTIAL TO THE SOLUTION OF DIFFUSION EQUATION

I. TEMPERATURE DISTRIBUTION IN A TRANSPIRATION COOLED HALF SPACE WITH VARIABLE THERMAL PROPERTIES

by L. N. GUPTA

The non-linear problem of transient temperature in a semi-infinite porous system being heated at the surface and cooled by inflowing coolant has been solved by the variational method based on local potential. It is assumed that the thermal conductivity of the porous solid and the specific heat of the coolant are given functions of the temperature. To bring out the effect of temperature dependence of the thermal properties results have been compared with the linear case studied by Chu and Seader (1965).

THERMAL STRESSES DUE TO AN INTERNAL SOURCE OF HEAT IN A SOLID ELASTIC HEMISPHERE WITH RADIATING CURVED SURFACE AND THE PLANE BASE RESTING ON A SMOOTH RIGID INSULATING PLANE SURFACE

by J. C. MISRA

In this paper, thermal stresses have been determined in a hemisphere having an internal source of heat, taking into account the radiation from the free curved surface and assuming that the plane base rests on a smooth rigid insulating plane surface.

