tional condition $f_1(x+iy), f_2(x-iy)=o(1/y^n)$ is introduced, then $f(z)$ may have on (a, b) only poles and limit points of them of an even order less than n. The set of poles forms a set, of which no component is dense in itself. (Received July 29, 1946.)

Applied Mathematics

312. Hillel Poritsky and D. W. Dudley: *Conjugate action of involute helical gears with inclined axes.*

By an involute helical surface is meant a surface consisting of helices of a proper screw motion about an axis and such that a section by a plane perpendicular to the axis is an involute of a proper "base" circle. It is shown that two involute helical surfaces with inclined axes mate correctly in the sense that a uniform rotation of the one surface about its axis A is transformed into a uniform rotation of the other surface about its axis A', provided that certain inequalities in the distance and angle between A, A' are satisfied; the ratio of the two rotational velocities ω/ω' is independent of the distance between the two axes. The point of contact of the mating surfaces always moves along a fixed straight line in space with uniform velocity, this line being normal to each surface. Certain industrial applications are briefly discussed. (Received July 23, 1946.)

313. William Prager: *On the variational principles of plasticity.*

In earlier papers the author outlined a new mathematical theory of plasticity (Prikladnaia Matematika i Mekhanika N.S. vol. 5 (1941) pp. 419–430) and discussed certain variational principles associated with this theory (Duke Math. J. vol. 9 (1942) pp. 228–233). These variational principles were established under the assumption that the velocities or rates of stressing prescribed at the surface produce "loading" throughout the body. In the present paper this restriction is dropped and the general variational principles associated with the new theory of plasticity are established. (Received July 15, 1946.)

314. S. S. Shü: *On Taylor and Maccoll's equation of a cone moving in the air with supersonic speed.*

When an infinite cone is moving in the air with supersonic speed, the shock phenomena occur. Taylor and Maccoll (Proc. Roy. Soc. London, Ser. A. vol. 139 (1933) pp. 278–311) considered a conical flow behind an oblique shock wave and deduced a nonlinear ordinary differential equation which was integrated numerically. The purpose of the present note is first to transpose the equation to the differential-integral form $-\lambda'(\theta)=S_w \exp \int_\theta^{\theta_w}((2+\lambda'^2)/\lambda')d\theta/\rho \sin\theta$ (where S_w is a constant, e^λ is the ratio of the radial component of the velocity of the flow to the speed of the gas if allowed to be discharged into a vacuum and $\rho^{\gamma-1}=1-e^{2\lambda}(1+\lambda'^2)$) for which the author assumes the position and the intensity of the shock wave known and for which successive approximations are applied. In some cases, the sequence generated by the successive approximations is proved to be monotone and equi-continuous and therefore it converges uniformly to a solution of the problem in the large. A method is suggested for the practical calculation of the angle of the solid cone. The first approximation in which only the rational forms of elementary functions are involved gives a fairly good coincidence with Taylor and Maccoll's calculations. (Received July 20, 1946.)

315. J. L. Synge: *Approximations in elasticity based on the concept of function space.*

A state of an elastic body is defined by a set of six stress components, given as functions of position throughout the body. Such a state defines a point or vector S in function space, without any implication that the equations of equilibrium or compatibility or the boundary conditions are satisfied. A metric in the function space is defined by means of the strain-energy function. If S is the solution to a problem in which surface stress is given, S' an arbitrary state satisfying the equations of equilibrium and the boundary conditions (but not the equations of compatibility), and S'' another arbitrary state satisfying the equations of compatibility (but not the equations of equilibrium or the boundary conditions), then S is situated on the intersection of a hypersphere determined by S' and a hyperplane determined by S''. The center C of this hypercircle may be regarded as the "best" approximation. Its energy-error is given through the radius R of the hypercircle, which may be calculated from the formula $R=2^{-1}|S'-S''(S'\cdot S'')/S''^2|$. The method can be extended by using a sequence of states S_1'', S_2'', $\cdots$, and may also be used when the surface displacement is given instead of the surface stress. (Received July 22, 1946.)

316. C. A. Truesdell: *On Behrbohm and Pinl's linearization of the equation of two-dimensional steady flow of a compressible adiabatic fluid.*

In a recent note Behrbohm and Pinl (Zeitschrift für angewandte Mathematik und Mechanik vol. 21 (1941) pp. 193–203) have achieved a new linearization of the potential equation of two-dimensional steady adiabatic compressible flow in generalization of the Minkowski linearization of the equation for minimal surfaces. The author shows that Behrbohm and Pinl's result is equivalent by a simple change of variable to the ordinary linearization by Legendre's transformation, that Behrbohm and Pinl's subsidiary condition on the variables is superfluous, and that hence two of their variables may be interpreted physically as components of the velocity vector. He shows that Behrbohm and Pinl's equation suggests immediately the classical solutions of Tschaplygin. He discusses the possibility of other separations of the variables, and concludes that it is unlikely that any exist. (Received July 12, 1946.)

317. Alexander Weinstein: *On the method of sources and sinks.*

This paper contains an extension of the method of sources and sinks. New types of flows are obtained by taking sources distributed on circumferences, disks and cylinders. The procedure requires a modification of several formulae given by Beltrami who failed to recognize that Stokes' stream function of a circumference is a many-valued function. (Received July 6, 1946.)

Geometry

318. L. A. Dye: *A Cremona transformation in S_3 defined by a pencil of quartic surfaces.*

An involutorial Cremona transformation in S_3 is defined by means of a pencil of quartic surfaces $|F_4|$ with γ_{11} of genus 14 and γ_5 of genus 2, $[\gamma_{11}, \gamma_5]=18$ as a base. The γ_5 lies on a quadric H which intersects $|F_4|$ in γ_5 and a system of twisted cubics $|C_3|$. The residual intersections of the bisecants of a C_3 cut from the associated F_4 are pairs of conjugate points in the involution I. The γ_5 is invariant, not fundamental,