

The proof consists in an asymptotic calculation of  $U(x, \rho)$  based on the theory of asymptotic solution of ordinary linear differential equations involving a parameter, as developed by G. D. Birkhoff, Noaillon, Tamarkin, Trjitzinsky and others. (Received January 8, 1942.)

#### APPLIED MATHEMATICS

##### 122. Stefan Bergman: *Two-dimensional flow around two profiles.*

The study of the influence of tail surfaces on lift and pressure distribution of a wing can be reduced to the investigation of problems in the conformal mapping of doubly connected domains. The use of orthogonal functions enables one to give simple formulas for the lift and the moment in the case of a uniform flow around one and around two profiles. In the first case the lift,  $L$ , is found to be the expression  $L = 4(\pi)^{1/2} \rho V^2 (\sum |\phi_\nu(0)|^2)^{1/2} \sin [\alpha + \pi - \arg (\sum^* \psi_\nu(b) \phi_\nu(0))]$ , where  $\rho$  is the density,  $V e^{-i\alpha}$  the velocity at infinity,  $\psi_\nu(z) = \int_0^z \phi_\nu(z) dz$ , and  $\{\phi_\nu(z)\}$  a complete system of orthonormal polynomials of a domain  $B$ . ( $B$  is the domain obtained from the exterior of the profile by the transformation  $z = 1/\zeta$ ,  $b$  is the coordinate of the cusp, and the summation  $\sum^*$  is understood in a certain special sense.) Analogous formulas exist for the moment and similar ones in the case of a flow around two profiles. (See also Notes of Lectures on Conformal Mapping, publication of Brown University, chap. XI, §§5-7) (Received January 29, 1942.)

##### 123. Henry Wallman: *On the reduction in harmonic distortion due to high frequency pre-emphasis.* Preliminary report.

It is now common practice in high-fidelity sound broadcasting, in either FM or AM, to employ high frequency pre-emphasis, the object being an increase in signal-to-noise ratio. An additional effect, namely a reduction in harmonic distortion, has been noted experimentally. An analysis of this reduction in distortion is made in this paper, and quantitative evaluations are given for single-tone harmonic distortion of all orders. (Received December 30, 1941.)

##### 124. Alexander Weinstein: *Spherical pendulum and complex integration.*

The following theorem, due to Puiseux (Journal de Mathématiques, 1842) is proved by a simple application of the theory of residues: The increment of the azimuth of a spherical pendulum corresponding to its passage from the lowest level  $z_1$  to the highest level  $z_2$  is greater than  $\pi/2$ . The boundary of the domain in the complex  $z$ -plane to which Cauchy's theorem is applied consists of a cut connecting  $z_1$  with  $z_2$  and of a vertical straight line to the right of  $z_2$ . (Received January 26, 1942.)

#### GEOMETRY

##### 125. P. O. Bell: *The parametric osculating quadrics of a family of curves on a surface.*

In this paper the author investigates the properties of the parametric osculating quadrics of a family of curves on a surface. These quadrics were introduced by Dan Sun (Tôhoku Mathematical Journal, vol. 32 (1930), pp. 81-85). His definition is essentially the following: At three neighboring points  $P, P_1, P_2$  on an asymptotic curve  $C_u$  of a surface  $S$  construct the tangents to the curves of a one-parameter family on  $S$ .