35. J. J. Stoker: *Nonlinear theory of curved elastic sheets.*

The membrane theory of thin elastic shells, which is based on the assumption that bending stresses can be neglected, is relatively simple from the mathematical point of view since the stresses can be determined independently of the strains. However, it is not possible then, in general, to satisfy boundary conditions which refer to displacements—such as, for example, the condition of a fixed edge. The present paper presents a theory of thin shells which neglects bending stresses but which, nevertheless, makes it possible to satisfy various types of boundary conditions which are reasonable from a physical point of view, such as that of a fixed edge. This is accomplished by taking into account certain of the quadratic terms in the expressions for the strains as functions of the displacements, in a manner analogous to that employed in deriving the von Kármán equations for bending of thin plates. (Received October 4, 1944.)

Ergodic Theory

36. P. R. Halmos: *On an incompressible transformation.*

E. Hopf has introduced a very strong notion of incompressibility for one-to-one measurable transformations on a measure space and showed that a transformation is incompressible in that sense if and only if it possesses a positive finite invariant integral. Recently Hurewicz has shown that under the assumption of a much weaker notion of incompressibility a very elegant generalization of Birkhoff's ergodic theorem is valid. The purpose of this note is to point out the following two facts: (1) If a transformation does possess an invariant integral, the Hurewicz theorem can be made to follow from known results for measure preserving transformations. (This fact is not immediately obvious only because of the rather peculiar formation of the Hurewicz means.) (2) There exists a one-to-one measurable transformation on a measure space which has the weak but not the strong property of incompressibility. (This fact in addition to answering a question explicitly raised by Hopf also serves to show that Hurewicz's theorem is indeed an extension of Birkhoff's.) (Received October 16, 1944.)

Geometry

37. Felix Bernstein: *The swastika and the Sicilian triskelon from the standpoint of "higher geometry."*

From the standpoint of higher geometry as defined by Felix Klein, the swastika and the triskelon are interpreted by the crystallographic groups of the plane, which are known groups composed of translations and rotations, with an angle of rotation of $360/n$ degrees, where n is restricted to the values 2, 3, 4, 6. The known fundamental domains (F.D.) of these groups with one center of symmetry are altered here into F.D. with two centers of symmetry. The broken line of greatest length connecting the two centers is called an arm and the smallest region whose boundary consists of arms only is called a blitz according to its shape. A blitz and its images produced by the operations of the group in the case $n=4$ fill the whole plane with swastikas, in the case $n=6$ with a like set of triskelons. With the aid of a properly generalized swastika it is possible, in an analogous manner, to fill euclidean space. By certain alterations of given F.D., a proof of the Pythagorean Theorem is obtained. (Received December 1, 1944.)

38. John DeCicco: *Survey of polygenic functions.*

The author presents a general outline of the theory of the first and second derivatives of a general polygenic function. This leads to the geometry of the related circles, limaçons, and cardioids. (When the function is monogenic, these related curves degenerate into points.) In addition to summarizing the already published material, many new theorems are included. (Received October 26, 1944.)

39. V. G. Grove: *Quadrics associated with a curve on a surface.*

The quadrics of Darboux, Moutard and Davis, the conjugal quadrics, the asymptotic osculating quadrics and many other quadrics belong to a certain family of quadrics. This paper seeks to characterize all of the members of this family in terms of cross-ratios. In so doing a generalization is obtained for Bell's R-associate of a line in the tangent plane. Some special quadrics of the pencil are characterized and new characterizations of the pan-geodesics are obtained. (Received October 7, 1944.)

40. C. C. Hsiung: *A ternary of plane curvilinear elements with a common singular point.*

This paper studies three curves having a common singular point of different kinds and a common tangent at the point. A projective invariant is found and characterizations are found for the invariant for various kinds of singularities. (Received October 7, 1944.)

41. Edward Kasner: *Multi-valued symmetries.*

The author studies conformal symmetry in a general algebraic curve. This is equivalent to Schwarzian reflection for an analytic curve. For an algebraic curve of degree n, the operation T is in general of degree n^2. The degrees of the powers of T are studied in detail. In the special case of a conic, the results are noteworthy. If the base curve is a potential curve (obeys the Laplace equation), symmetry is easily constructible. Satellite curves discussed in a previous paper are related to the present theory. (Received October 26, 1944.)

42. E. J. Purcell: *Some Cremona involutions in n-dimensional space.*

A previous paper (E. J. Purcell, *Variety congruences of order one in n-dimensional space*, Amer. J. Math. vol. 66 (1944) pp. 621–635) discusses linear k-parameter systems of varieties in n-dimensional projective space (k any positive integer not greater than n). Each variety of such a system is of dimension $n-k$ and order h (h any positive integer). Through a generic point of $[n]$ one and only one variety of the system passes. When $n=k$ and $h=2$, a generic variety of the system is a pair of points. Each point determines the pair to which it belongs and the system consists of the pairs of a rational Cremona involution in $[n]$. This paper treats a type $(n)_n$ Cremona involution in $[n]$. When $n=2$, the involution is Geiser's. When $n=3$, the involution is due to Sharpe and Snyder. (Received October 25, 1944.)

Statistics and Probability

43. T. R. Hollcroft: *The probability of repetitions.*

The probability of repetitions is concerned with repetitions only and not with the particular numbers that are repeated. For example, let one number be drawn at a time from ten and replaced after each draw. Eight may be drawn as follows: 4 3 7 6 4 7 6 7. This set contains one triple and two double repetitions. The double