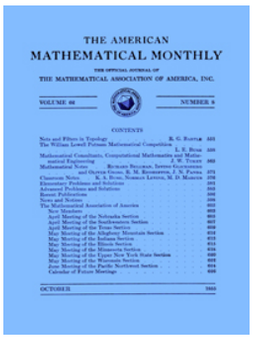

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The May Meeting of the Indiana Section

J. C. Polley (Secretary)

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A mathematical model is constructed which is intended to characterize the mechanical behavior of a pre-sintered powdered metal. Suitable plastic potential surfaces are discussed and the corresponding stress-strain laws derived. Uniqueness theorems and minimum principles are established.

2. *An experiment in probability*, by Professor Emeritus E. A. Whitman, Carnegie Institute of Technology.

In this paper the author shows one arrangement of successes where the probability of success is known and another arrangement of successes where the probability of success is determined experimentally. In both cases the interest is in the distribution of successes that are relatively infrequent.

3. *Symposium on automatic digital computers.*

High speed electronic computers are being more and more widely used to solve both scientific and industrial problems. The following three papers outlined some of the methods currently used in preparing problems for high speed computation:

(1) *Basic programming*, by Dr. Ruth Goodman,

(2) *Automatic coding*, by Dr. D. H. Shaffer,

(3) *Numerical integration*, by Dr. Morris Ostrofsy,

staff members of the Research Laboratory, Westinghouse Electric Corporation, Pittsburgh, Pennsylvania.

L. T. MOSTON, *Secretary*

THE MAY MEETING OF THE INDIANA SECTION

The thirty-second annual meeting of the Indiana Section of the Mathematical Association of America was held at Butler University, Indianapolis, Indiana, on May 7, 1955. Two sessions were held at which Professor H. W. Alexander of Earlham College, Chairman of the Section, presided.

There were 60 in attendance, including the following 52 members of the Association:

H. W. Alexander, W. C. Arnold, Juna L. Beal, L. G. Black, A. P. Boblett, Stanley Bolks, C. F. Brumfiel, G. E. Carscallen, W. W. Chambers, K. W. Crain, H. E. Crull, M. W. DeJonge, W. E. Edington, P. D. Edwards, C. B. Gass, E. L. Godfrey, S. H. Gould, G. H. Graves, Ralph Hafner, H. H. Hartzler, Ralph Hull, H. L. Hunzeker, M. W. Keller, E. L. Klinger, Florence Long, Gladys B. McColgin, D. M. Mesner, G. T. Miller, Vera T. Morris, J. E. Mueller, R. H. Oehmke, Theresa M. C. Oehmke, Gloria Olive, C. C. Oursler, P. W. Overman, T. P. Palmer, J. C. Polley, D. H. Porter, J. N. Rogers, R. M. Ross, A. R. Schmidt, K. J. Sidebottom, Sister Gertrude Marie, C. P. Sousley, Anna K. Suter, R. O. Virts, M. S. Webster, K. P. Williams, Herbert Wolf, Elizabeth S. Wolf, H. E. Wolfe, G. N. Wollan.

The following officers were elected: Chairman, Mr. R. O. Virts, Central High School, Fort Wayne, Indiana; Vice-Chairman, Professor C. F. Brumfiel, Ball State Teachers College; Secretary-Treasurer, Professor J. C. Polley, Wabash College.

Both sessions were held in the Holcomb Observatory, recently constructed and in use this year for the first time. Professor G. C. McVittee, Director of the Observatory at the University of Illinois, was guest speaker for the hour lecture. The title of the lecture was: *Why should an astronomer study relativity?*

Professor H. E. Crull of Butler University gave a planetarium demonstration following the lecture.

Professor P. D. Edwards, chairman of the Committee on Awards, reported that four Association medals had been awarded for high mathematical achievement in the Indiana Science Talent Search.

The following papers were presented:

1. *Some elementary properties of bonding mappings*, by Professor R. H. Oehmke, Butler University.

In any non-associative algebra A of characteristic not 2, with a subspace S closed under the operation $(x, y) = \frac{1}{2}(xy+yx)$, $U(S)$ denotes the subspace generated by all elements $xy-yx$ for x and y in S. If T is any linear mapping from $U(S)$ into S, a multiplication $x \circ y$ can be defined in S as $x \circ y = \frac{1}{2}(xy+yx)+(xy-yx)T$. Thus a new algebra $B(A, T)$ is defined which is in the same vector space as S and is closed under the product $x \circ y$. This algebra is said to be *bonded* to A by the *bonding mapping* T. The behavior of associative, Jordan, Lie, and power-associative algebras under a bonding mapping was examined. Such tools as ideals, idempotents, derivations, *etc.* used for the study of the structure of algebras were also examined.

2. *The mathematical theory of the Hatchet Planimeter*, by Professor P. D. Edwards, Ball State Teachers College.

The March 1954 issue of *The Professional Geographer* contained a short description of the "Hatchet Planimeter" by R. L. Williams. The mathematical theory was not given. The instrument has been used to a limited extent by cartographers and others since its description by Prytz in 1889. In this paper the mathematical theory is presented and comments made on the degree of accuracy to be expected.

3. *A summary of integral methods*, by Professor T. P. Palmer, Rose Polytechnic Institute.

Integration methods can be summarized under six topics: (1) the integral of $u^n du$, with $n = -1$ as a special case; (2) a collection of eight exact differentials (exponential and trigonometric; eleven, if including hyperbolic functions); (3) integration by parts; (4) substitution (chiefly trigonometric); (5) partial fractions; and (6) trigonometric identities. The last four topics are not really calculus, but provide ways of rearranging so that the first two topics apply. The only differential included which is not familiar from differential calculus is $d \ln (\sec x+\tan x) = \sec x dx$. By these methods, any form whose integral can be expressed in elementary functions can be integrated easily without reference to tables.

4. *Some embedding theorems for incidence matrices*, by Professor D. M. Mesner, Purdue University.

To a given incidence matrix A, matrices B, C, and D are to be adjoined so that

$$\begin{pmatrix} A & B \\ C & D \end{pmatrix}$$

is an $m \times n$ incidence matrix with equal row totals T and equal column totals U. The required numbers of 0's and 1's in each row of B and column of C, and in the entire block D, are easily computed. It is obviously necessary for the existence of B, C, and D that these numbers be non-negative, and that $mT = nU$. These are shown to be sufficient conditions as well. This generalizes a theorem of Ryser (*Proc. Amer. Math. Soc.*, vol. 2, 1951, 550–552).

5. *Some applications of evenly convex sets*, by Dr. J. R. Blum, Indiana University, introduced by Professor K. P. Williams.

A convex set in finite-dimensional Euclidean space is called evenly convex (W. Fenchel, *A remark on convex sets and polarity*, Comm. du sem. math. de L'un. de Lund, tome supp., 1952) if it is the intersection of a family of open half-spaces. Criteria are given for a convex set to be evenly convex, and for a vector to belong to an evenly convex set. These are applied to obtain an existence criterion for unbiased tests of finite statistical hypotheses.

6. *Mohr space representation of algebraic equations*, by Professor M. O. Peach, University of Notre Dame.

The Mohr circle construction used by engineers to represent the stress tensor is extended to space of higher dimensions, hence to square symmetric matrices of arbitrary rank. It is then generalized to represent non-symmetric matrices. A step by step method for diagonalizing such matrices is interpreted geometrically, both for the case of real and the case of complex characteristic roots. The well known procedure for writing the matrix for which a given algebraic equation is the characteristic equation provides the connecting link whereby any algebraic equation can be given a unique geometrical representation in Mohr space.

7. *The structure of commutative semigroups*, by Professor R. E. MacKenzie, Indiana University, introduced by Professor H. E. Wolfe.

By suitably formulating the basic structure theorems of commutative rings it is possible to carry through their demonstration without the use of the operation of addition. These theorems then become statements about the structure of commutative semigroups. The formulation is such that the theorems on rings may then be obtained by assuming that the semigroup is a ring.

J. C. POLLEY, *Secretary*

THE MAY MEETING OF THE ILLINOIS SECTION

The thirty-fourth annual meeting of the Illinois Section of the Mathematical Association of America was held at Monmouth College, Monmouth, Illinois, on May 13 and 14, 1955. Professor Rothwell Stephens, Chairman of the Section, presided at all sessions.

There were 47 in attendance, including the following 37 members:

Beulah M. Armstrong, H. G. Ayre, J. W. Beach, H. R. Beveridge, D. R. Bey, A. H. Black, A. O. Boatman, H. A. Bott, Joseph R. Brown, L. J. Burton, Paul Cramer, Allen Fenstermacher, S. R. Filippone, A. E. Gault, A. E. Hallerberg, M. C. Hartley, F. E. Hohn, M. R. Kenner, E. C. Kiefer, Rose Lariviere, A. O. Lindstrum, Jr., Saunders MacLane, W. G. Madow, W. C. McDaniel, A. W. McGaughey, E. B. Miller, M. G. Moore, C. E. Moulton, T. E. Rine, L. A. Ringenberg, W. C. Ross, Jr., M. Anice Seybold, W. H. Spragens, Jr., Rothwell Stephens, Gabriel Tsiang, L. L. Wimp, Alice K. Wright.

At the business meeting on Friday afternoon the following officers were elected for the coming year: Chairman, Professor H. R. Beveridge, Monmouth College; Vice-Chairman, Professor L. A. Ringenberg, Eastern Illinois State College; Secretary-Treasurer, Professor A. W. McGaughey, Bradley University. Professor Joseph Stipanowich reported on the work of the "Committee on Contests and Awards" stating that the number of high schools participating increased over that of the preceding year by almost 80%. Professor A. O. Lindstrum, Jr., reported on the work done by the "Committee on the Strengthening of the Teaching of Mathematics" and proposed several resolutions which were adopted.