

than has been done before and is applied to transversal deformations and vibrations of plates and to the general 2-dimensional problem of elasticity. The chapter properly concludes with Plateau's problem which has recently entered upon a new phase through J. Douglas' ideas, and to which Courant himself has contributed largely during his last New York years.

The present volume is sprinkled throughout with a wealth of little new illuminating observations which this review had to skip. The author apologizes that lack of time prevented him from fitting out his book with a full sized index of literature and such paraphernalia. The same reason may be responsible for quite a few misprints on which the reader will occasionally stumble. But perhaps even these minor faults deserve praise rather than blame. Although I know that a craftsman's pride should be in having his work as perfect and shipshape as possible, even in the most minute and inessential details, I sometimes wonder whether we do not lavish on the dressing-up of a book too much time that would better go into more important things.

HERMANN WEYL

CONTRIBUTIONS TO THE CALCULUS OF VARIATIONS

Contributions to the Calculus of Variations, 1933-1937. (Theses submitted to the Department of Mathematics at the University of Chicago.) University of Chicago Press, 1937. 7+566 pp.

This volume is the third in the series of contributions to the calculus of variations published by the Department of Mathematics of the University of Chicago since 1930.* It contains thirteen doctoral dissertations, written under the direction of Professors Bliss, Graves, and Reid. The reader acquainted with the work of these mathematicians can make a fair guess as to the way in which responsibility for these papers is to be distributed among them.

The book is uniform in appearance and in style with the earlier ones. About half the papers are followed by a list of references or a bibliography. They are all written with care, conditions are carefully stated, and conclusions are clearly set out. Their contents give a clear picture of the direction in which the work in the calculus of variations has been developed at the University of Chicago in recent years. The contributions contained in the volume are the following:

1. *The problem of Lagrange with finite side conditions*, by J. W. Bower (pp. 1-52).
2. *Fields for multiple integrals in the calculus of variations*, by Byron Cosby, II (pp. 53-84).
3. *The minimum of a definite integral with respect to unilateral variations*, by J. D. Mancill (pp. 85-164).
4. *The Hamilton-Jacobi theory for the problem of Lagrange in parametric form*, by Van Bauman Teach† (pp. 165-206).
5. *Sufficient conditions for a minimum in the problem of Lagrange with isoperimetric conditions*, by I. E. Perlin (pp. 207-242).
6. *A boundary value problem of the calculus of variations*, by E. P. Wiggin (pp. 243-276).

* The first of these was reviewed in this Bulletin, vol. 38 (1932), p. 617; the second in vol. 39 (1933), p. 641.

† Deceased before the publication of the volume.