applications to classical mechanics. A very lucid form of Noether's theorem for single integrals is given.

Sufficient conditions for weak and strong extrema are derived via the usual theory of the second variation in chapters 5 and 6 respectively, the latter depending to a large extent on the concept of fields of extremals which is introduced with great care. While the condition of Jacobi appears relatively early (p. 112), the excess function of Weierstrass is defined for the first time at an unusually late stage (p. 146).

Multiple integral problems with application to continuous mechanical systems are treated in chapter 7. A detailed calculation based on the first variation leads to Noether's theorem and its role in field theory. Again it seems a pity that the remarkable but distinct theories of multiple integral problems due on the one hand to Carathéodory (Acta Szeged Sect. Scient. Math. 4 (1929), 193-216; also reproduced in collected works, vol. 1) and on the other to H. Weyl (Ann. Math. 36 (1935), 607-629) are ignored completely, for these theories first opened the way to the rigorous study of sufficient conditions for extreme values.

Chapter 8 gives a lucid introduction to the theory of direct methods (e. g. the Ritz method). In appendix 1 the propagation of disturbances is briefly treated by Finsler space methods (although the authors do not say so). Appendix 2 furnishes an account of the application of variational methods to problems of optimal control, which is a fairly recent development not treated in standard texts. This unique feature adds lustre to what is in general an excellent book.

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Variationsrechnung, by L. Koschmieder. Sammlung Göschen, Band 1075. Walter de Gruyter and Co., Berlin, 1962.

This is a compact but fairly rigorous introduction to the basic concepts of the calculus of variations. The text is restricted largely to problems based on single integrals whose integrands involve only one or two dependent functions. The methods are classical, a clear distinction being made between the theories based on fixed and movable end points. These are described in the first two chapters, while the third and last gives an excellent description of classical isoperimetric problems.

This book, which conforms in every respect with the fine tradition of the well-known "Göschen"-series, is to be followed by a text dealing with more general problems and modern direct methods.

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