Multiple Integrals

in the Calculus of Variations

By **Charles B. Morrey, Jr.**
Professor of Mathematics,
University of California,
Berkeley

The theme underlying this book is the theory of the
existence and differentiability of the solutions of problems
in the calculus of variations involving multiple integrals.
In treating this subject it became necessary to discuss
related topics such as the theory of elliptic systems of
partial differential equations and the theory of the so-called
SOBOLEV spaces. A feature which has been until very
recently peculiar to the subject of this book is the necessity
of studying linear elliptic systems in which the coefficients
may be discontinuous; the book contains an exposition
of the famous DE GIORGI-NASH-MOSER results as
well as the author's previous results concerning such
equations. Proving the results concerning the higher
differentiability requires the study of standard linear
elliptic systems of the second order. Since the methods of
handling such systems are entirely similar to those for
handling linear systems of higher order, a chapter is
devoted to such systems. The analyticity of the solutions
requires a proof of the analyticity of general non-linear
elliptic systems with general boundary values. The last
two chapters of the book are concerned mainly with the
classical work on the plateau problem in two dimen-
sions and the work of REIFENBERG on the higher
dimensional Plateau problem. The variational method is
applied to harmonic integrals on real and complex
manifolds.

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