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STATIC AND DYNAMIC
ELECTRICITY

INTERNATIONAL SERIES IN
PURE AND APPLIED PHYSICS

G. P. HARNWELL, *Consulting Editor*

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Dr. Lee A. DuBridge was consulting editor of the series from 1939 to 1946.

STATIC AND
DYNAMIC ELECTRICITY

BY
 WILLIAM R. SMYTHE
*Professor of Physics
 California Institute of Technology*

SECOND EDITION

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PREFACE TO THE SECOND EDITION

The wide use of rationalized mks units and the increased importance of microwaves made this radical revision of the first edition imperative. The units are changed throughout. The resultant extensive resetting of the text permits a modernization of nomenclature through such changes as "capacitor" for "condenser" and "electromotance" for "electromotive force." The original wording has been preserved only in the Cambridge problems. In static-field chapters, forty problems of above-average difficulty have been added, usually covering boundary conditions omitted in the first edition. The expanded treatment of electromagnetic waves made necessary the rewriting of the parts of Chapter V dealing with Bessel functions and led to the introduction of vector surface harmonics, which greatly simplify some calculations. Much of Chapter XI on eddy currents has been rewritten, and two of the three electromagnetic-wave chapters are entirely new. Both the text and the 150 problems include methods and results not found in the literature. Two groups of advanced Ph.D. students worked over this material to get practice in attacking every type of wave-field problem. Many are too difficult for first-year graduate students, but every problem was solved by at least one of the advanced students. They can be worked either directly from the text or by fairly obvious extensions of it. Some useful results appear in the problems and are listed in the Index, which should be consulted by engineers with boundary value problems to solve. Chapter XV of the first edition is omitted because none of the remaining theory is based on it and because to bring it up to date would require an excessive amount of space.

None of the new topics appears to lie outside the scope of the mathematical preparation assumed for readers of the first edition. That the successful solution of electrical problems depends on physical rather than mathematical insight is borne out by the author's experience with the first edition, which shows that graduate students in electrical engineering and physics greatly excel those in mathematics.

It is believed that very few of the errors and obscure or ambiguous statements in the first edition escaped the scrutiny of the 375 students at the California Institute of Technology who worked it through. No infallible system for locating errors caused by the transposition of units has been found, and the author will appreciate letters from readers pointing them out.

WILLIAM R. SMYTHE

PASADENA, CALIF.
July, 1950

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