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978-1-108-00490-9 - Elements of the Mathematical Theory of Electricity and Magnetism

John Joseph Thomson

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The British physicist Sir Joseph John Thomson published the first edition of his *Elements of the Mathematical Theory of Electricity and Magnetism* in 1895 and this fourth edition in 1909, three years after he was awarded the Nobel Prize in Physics for his theoretical and experimental investigations on the conduction of electricity by gases. In this book for students his intention is to give ‘an account of the fundamental principles of the Mathematical theory of Electricity and Magnetism and their more important applications, using only simple mathematics’.

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ELEMENTS
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ELECTRICITY AND MAGNETISM

BY

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PREFACE TO FIRST EDITION

IN the following work I have endeavoured to give an account of the fundamental principles of the Mathematical theory of Electricity and Magnetism and their more important applications, using only simple mathematics. With the exception of a few paragraphs no more advanced mathematical knowledge is required from the reader than an acquaintance with the Elementary principles of the Differential Calculus.

It is not at all necessary to make use of advanced analysis to establish the existence of some of the most important electromagnetic phenomena. There are always some cases which will yield to very simple mathematical treatment and yet which establish and illustrate the physical phenomena as well as the solution by the most elaborate analysis of the most general cases which could be given.

The study of these simple cases would, I think, often be of advantage even to students whose mathematical attainments are sufficient to enable them to follow the solution of the more general cases. For in these simple cases the absence of analytical difficulties allows attention to be more easily concentrated on the physical aspects of the question, and thus gives the student a more vivid

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idea and a more manageable grasp of the subject than he would be likely to attain if he merely regarded electrical phenomena through a cloud of analytical symbols.

I have received many valuable suggestions and much help in the preparation of this book from my friends Mr H. F. Newall of Trinity College and Mr G. F. C. Searle of Peterhouse who have been kind enough to read the proofs. I have also to thank Mr W. Hayles of the Cavendish Laboratory who has prepared many of the illustrations.

J. J. THOMSON.

CAVENDISH LABORATORY,
CAMBRIDGE.
September 3, 1895.

PREFACE TO THE SECOND EDITION

IN this Edition I have through the kindness of several correspondents been able to correct a considerable number of misprints. I have also made a few verbal alterations in the hope of making the argument clearer in places where experience has shown that students found unusual difficulties.

J. J. THOMSON.

CAVENDISH LABORATORY,
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November, 1897.

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PREFACE TO THE THIRD EDITION

THE most important of the alterations made in this Edition is a new chapter on the properties of moving electrified bodies; many of these properties may be proved in a simple way, and the important part played by moving charges in Modern Physics seems to warrant a discussion of their properties in even an Elementary Treatise.

I have much pleasure in thanking Mr G. F. C. Searle of Peterhouse for many valuable suggestions, and for his kindness in reading the proof sheets of the first five chapters; to Mr P. V. Bevan of Trinity College I am indebted for similar assistance with the subsequent chapters.

J. J. THOMSON.

CAVENDISH LABORATORY,
CAMBRIDGE.
October 4, 1904.

PREFACE TO THE FOURTH EDITION

IN this Edition a few additions and corrections have been made.

J. J. THOMSON.

CAVENDISH LABORATORY,
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