AN ELEMENTARY TREATISE ON ALTERNATING CURRENTS

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BY

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PREFACE

HAVING been for some years engaged in lecturing to advanced students on the subject of alternating currents, the author has endeavoured to present, in as simple a manner as possible, a subject which, though intensely interesting in its purely physical aspect, is often expounded by mathematicians who, while revelling in the mathematical gymnastics afforded by its problems, so bewilder their less mathematical readers by the adoption of unnecessarily ponderous methods that the majority give up in disgust a subject which would otherwise exercise great fascination for them. That such should ever happen is lamentable in the extreme, since it retards the progress of the practical application of alternating currents.

The author has employed the method of vector algebra wherever possible to solve the various problems, as he has found that it is quite easy for a student knowing only the elements of algebra and trigonometry to obtain a good working knowledge of the method in a very short time, and become enabled to attack problems which are otherwise beyond his comprehension.

The application of vector algebra to alternating-current problems should appeal to everybody. It is a tool peculiarly adapted to the subject, and combines simplicity with all the advantages of a powerful method.

No one will dispute the use of a treatise on the subject in which the chief aim of the writer is to eliminate mathematical difficulties and give prominence to the physics of the subject. Since the author has engaged in practice as a consulting engineer he has found that the want of a simple though comprehensive treatise is often a deterrent to practical engineers acquiring a requisite knowledge of the subject.

Since the principles of continuous currents became intelligible to practical engineers, their commercial application has gone rapidly forward; it only requires the principles of alternating currents to be similarly placed before them for a like increase in their application to practice to result.

In the body of the book every effort has been made to eliminate mathematical difficulties, only a simple differentiation or integration being occasionally used. Those readers who are conversant with higher mathematics will find in the Appendix proofs of results which are assumed in the text, and also a few more difficult problems, some of which are of greater theoretical than practical interest.

The author hopes that his efforts will be appreciated by practical engineers, University honours students, and the more advanced students in Technical Schools studying for the Honours Grade in Electric Lighting for examinations of the City and Guilds of London Institute. It is to be emphasized that a short course of Vector Algebra should form a portion of the curriculum of every University College and Technical Institute.

As the book has been written in spare moments since leaving the teaching profession, the author has not been able to acknowledge all the various sources from which information has been obtained. The work is really a systematic arrangement of lecture notes compiled during the last ten years, and which contain information gathered from text-books, periodicals, and the journals of various learned societies, as well as from the writings of the author himself. It is, however, impossible to over-estimate the indebtedness to the writings of Professor S. P. Thompson and Mr. C. P. Steinmetz. It would, in fact, be impossible to write a treatise on alternating currents without drawing much from their valuable contributions to the subject.

The author has to thank Messrs. Ferranti Ltd., Messrs. Witting Brothers, Ltd., and The British Thomson-Houston Company, Ltd., for their kindness in giving him information respecting machines manufactured by them; his friends Dr. C. H. Lees of Owens College, Manchester, Mr. T. Mather of the

Central Technical College, London, and Miss Patterson, of the Manchester High School, for many suggestions and for reading the proofs, and also one of his assistants, Mr. W. Hyde, for preparing the figures and drawings.

It is to be hoped that no important error has escaped notice. Should, however, any reader detect any errors, the author will be glad if he will be good enough to point them out.

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