POTENTIAL AND ITS APPLICATION TO THE EXPLANATION OF ELECTRICAL PHENOMENA: POPULARLY TREATED

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DR. OTTOKAR TUMLIRZ & D. ROBERTSON

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BY

DR. TUMLIRZ

LECTURER IN THE GERMAN UNIVERSITY AT PRAGUE

TRANSLATED BY

D. ROBERTSON, M.A., LL.B., B.Sc.

FORMERLY ONE OF THE ASSISTANT MASTERS, UNIVERSITY COLLEGE SCHOOL

RIVINGTONS

WATERLOO PLACE, LONDON

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TRANSLATOR'S PREFACE

THE translation of Dr. O. Tumlirz's book on potential has been undertaken from a strong conviction that it will prove useful to students of physics.

The term potential was originally introduced into the language of science in order to denote an abstract mathematical conception, which, when introduced physically, is seen to afford a simple and comprehensive expression for some of the most fundamental relations involving the idea of force. The notion of potential has thus come to form the starting-point of the modern theoretical treatment of several very important branches of science, and notably of electricity and magnetism; familiarity with it has consequently become essential for the accurate study of even the elementary parts of these subjects.

In consequence, however, of the essentially mathematical nature of the conception, and of the fact that it was introduced into science from the

mathematical and not from the physical side, an adequate and systematic exposition of the idea of potential has hitherto been confined almost entirely to books written from a somewhat advanced mathematical point of view, in which the matter has been presented in too abstract a manner, and often with too much of mathematical technicalities to be accessible to elementary students.

In the present volume Dr. Tumlirz has set himself to treat the same conception from the physical side, and, while all but avoiding the use of technical mathematics, has succeeded in producing a work which not only affords to non-mathematical readers a fuller exposition of the subject than is accessible to them in existing English treatises, but one which may be read with profit by students who are already familiar with the purely mathematical aspect of the same subject.

There does not appear to be any elementary, systematic treatise on this subject in the English language; and in elementary text-books on physics, potential can necessarily only be briefly explained. The book will, it is hoped, supplement the usual elementary text-books on electricity and magnetism, and give students a firmer grasp of the physical meaning of potential than is

possible to be obtained from a less extended exposition.

The book contains a considerable amount of information on collateral subjects not usually found in ordinary text-books.

The translator is very greatly indebted to Professor Carey Foster, F.R.S., of University College, London.

Professor Foster has very kindly revised the proofs throughout, and has assisted in more ways than it is possible to enumerate. Numerous improvements in the terminology originally adopted are due to the same source.

LONDON, *September* 1889.

PREFACE

COMPREHENSIVE classification of acquired knowledge is the chief object in every science, and this object will be accomplished by seeking for such points amongst known facts as really indicate all groups of the same kind, and as it were draw red threads through them. If we observe the phenomena of heavy masses, of electricity and magnetism, we find in the case of each the same law of force. We might have in this law a guiding principle of the phenomena named; it appears, however, that it is not so much this force, but rather a certain work of this force, the potential, that affords in a preferable manner the desired view of the facts.

In the text-books which treat of the theory of potential this is at first introduced as a mathematical expression and treated throughout as such, whilst the treatment merely takes the form of discussing the properties of this expression, of this function. This may well be the reason why such vague views often prevail regarding the physical meaning of potential and its properties—why so often in the study of the phenomena of electricity some confound potential with density, others potential with electrical force. It is for this reason that the author of the present work, whose real object is to make a wider circle acquainted with the properties of potential, starts at first with the physical meaning