Matter and motion

Maxwell James Clerk
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BY THE LATE

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PREFACE (1877)

Physical Science, which up to the end of the eighteenth century had been fully occupied in forming a conception of natural phenomena as the result of forces acting between one body and another, has now fairly entered on the next stage of progress—that in which the energy of a material system is conceived as determined by the configuration and motion of that system, and in which the ideas of configuration, motion, and force are generalised to the utmost extent warranted by their physical definitions.

To become acquainted with these fundamental ideas, to examine them under all their aspects, and habitually to guide the current of thought along the channels of strict dynamical reasoning, must be the foundation of the training of the student of Physical Science.

The following statement of the fundamental doctrines of Matter and Motion is therefore to be regarded as an introduction to the study of Physical Science in general.
NOTE

In this reprint of Prof. Clerk Maxwell’s classical tractate on the principles of dynamics, the changes have been confined strictly to typographical and a few verbal improvements. After trial, the conclusion has been reached that any additions to the text would alter the flavour of the work, which would then no longer be characteristic of its author. Accordingly only brief footnotes have been introduced: and the few original footnotes have been distinguished from them by Arabic numeral references instead of asterisks and other marks. A new index has been prepared.

A general exposition of this kind cannot be expected, and doubtless was not intended, to come into use as a working textbook: for that purpose methods of systematic calculation must be prominent. But as a reasoned conspectus of the Newtonian dynamics, generalizing gradually from simple particles of matter to physical systems which are beyond complete analysis, drawn up by one of the masters of the science, with many interesting side-lights, it must retain its power of suggestion even though parts of the vector exposition may now seem somewhat abstract. The few critical footnotes and references to Appendices that have been added may help to promote this feature of suggestion and stimulus.

The treatment of the fundamental principles of dynamics has however been enlarged on the author’s own lines by the inclusion of the Chapter “On the Equations of Motion of a Connected System” from vol. ii of Electricity and Magnetism. For permission to make use of this chapter the thanks of the publishers are due to the Clarendon Press of the University of Oxford.
NOTE

With the same end in view two Appendices have been added by the editor. One of them treats the Principle of Relativity of motion, which has recently become very prominent in wider physical connexions, on rather different lines from those in the text. The other aims at development of the wider aspects of the Principle of Least Action, which has been asserting its position more and more as the essential principle of connexion between the various domains of Theoretical Physics.

These additions are of course much more advanced than the rest of the book: but they will serve to complete it by presenting the analytical side of dynamical science, on which it justly aspires to be the definite foundation for all Natural Philosophy.

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J. L.