The Mathematical Theory of Relativity. By Th. De Donder. First edition. Cambridge, Massachusetts Institute of Technology, 1927. x+102 pp.

This little book contains the text of the lectures delivered by Professor Th. De Donder of the University of Brussels at Massachusetts Institute of Technology. They give an account of the main mathematical structure of the theory of relativity and some of the investigations of the author himself. First the "Minkowskian field," that is, special relativity, is introduced, and general point transformations are studied in this geometry. Then it is, mathematically speaking, easy to pass to the "Einstein field" of general relativity. The parallel displacement of Levi-Civita appears here as a formal consequence of the transformation theory. The study of kinematics leads to the covariant formulation of Coriolis' theorem, a special topic of study by Professor De Donder and some of his collaborators. The following paragraphs deal with the principal laws of point mechanics, electrodynamics of bodies at rest and moving, and the dynamics of continua; they are deduced from variational principles. In this respect the author has done much original research, and we find in this book a survey of what he has reached.

In a last chapter we find a relation of Schrödinger's wave equation to the theory of relativity; here we reach the covariant formulation of this equation given independently at about the same time by V. Fock and the author of this book. A generalization to continuous systems follows. This, however, is difficult to understand.

In a general introduction some of the outstanding points in the present state of the theory of relativity are discussed. As an example we mention the impossibility of accounting for positive and negative electricity, and the difficulties in the explanation of the experiments of D. C. Miller.

The book shows, as do all Professor De Donder's publications, his great mathematical ability. But in a publication like this we should have liked a broader introduction into the mathematical foundations of the theory of relativity. It is not emphasized at all that we have to do with groups and their theory of invariants and covariants. The contrast is the stronger if we compare this book with the recently published lectures of Felix Klein on the same subject. This is one of the reasons that the book will be hard to read for anyone not very familiar with the theory of tensors, and without some general physical and mathematical knowledge on the subject of relativity. The research worker, however, will find useful information in De Donder's book.

D. J. Struik

Congruenze Algebriche ed Esponenziali. Applicazioni. II. By Paolino Fulco. Civitavecchia, Moderno, 1928. 230 pp.

The book contains in extremely lengthy form the elements of the theory of higher congruences for a prime modulus, intended for a first course. Numerous numerical examples are inserted in the text. The author states in the introduction: "The major part of the results obtained are original, and are not to be found in the authors cited above, nor in others." I have, however, not been able to discover any new results of importance in the book.

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