

series. If all the coefficients after the first are zero, the distribution follows the law of Gauss. If some of them are not zero, there is a variation from this simple law. The series usually converges very rapidly.

H. B. PHILLIPS.

*Mathematical and Physical Papers.* By SIR WILLIAM THOMSON, BARON KELVIN. Volume IV. *Hydrodynamics and General Dynamics.* xv+563 pp., 1910. Volume V. *Thermodynamics, Cosmical and Geological Physics, Molecular and Crystalline Theory, Electrodynamics.* xv+602 pp., 1911. Volume VI. *Voltaic Theory, Radioactivity, Electrons, Navigation and Tides, Miscellaneous.* viii+378 pp., 1911. Arranged and revised with brief annotations. By SIR JOSEPH LARMOR. Cambridge (England): at The University Press.

THAT the works of Lord Kelvin are now available in collected form is a source of gratification to physicists, mathematicians, and especially to mathematical physicists including students of mechanics. Particular thanks are due to Sir Joseph Larmor, who for these editorial duties must have sacrificed a great deal of time that could otherwise have gone to his own researches. And in the present confused state of theoretical physics we sorely need those researches.

Varied as were Lord Kelvin's contributions to physics, he may well be ranked as a student of mechanics and of the mechanical explanation of the world. The central monument in his system is the Thomson and Tait, from which he looks deep into every surrounding structure, and which itself is, to the present time, the climax of the works begun in the *Principia*. It was this mechanical bent which led him to search so constantly for a mechanical, as opposed to a purely electromagnetic, ether; and it was this which caused his contributions to ether theories to be less vital than those of some others who kept closer in touch with the electromagnetic point of view and who have built up the idea of the electromagnetic theory of matter and mechanical actions. In these matters Lord Kelvin during the last thirty years of his life should be classed as conservative if not reactionary.

The three volumes before us are the continuation of the series which Lord Kelvin himself had started. In 1882 Volume I appeared with seventy-three papers chiefly of dates 1841-53; two years later Volume II showed papers numbered 74 to 91,

which had appeared mainly in 1853-56; and in 1890 the third volume, dealing mainly with elasticity, heat, and electromagnetism, appeared with titles 92 to 104. There was also the separate volume, Reprint of papers on electrostatics and magnetism, which had appeared first in 1872 and again in 1884. And furthermore there are the Baltimore Lectures, delivered in 1884, but printed (with numerous additions) only in 1904. In view of this diverse procedure, Larmor found himself unable profitably to continue the old numbering of the first three volumes, and has carried a new series of numbers from 1 to 277 through the three volumes he edits. To some of these numbers correspond merely the titles of papers previously reprinted but cited here for continuity; and there are at the end of volume V some sixty pages of contributions (to engineering societies) which carry no serial number.

It would be futile here to attempt to go into detail as to the contents of these three volumes, which range over some sixty years and contain many of the important contributions of a great and versatile mathematician and physicist; to review them critically would be to review in large measure the progress of physics for the second half of the nineteenth century. We refer the reader to the subheadings, as listed above, to Larmor's interesting prefaces, and to his life of Lord Kelvin in the *Proceedings* of the Royal Society, volume 81 (1908), pages iii-lxxvi. The closer student can only be referred to the text itself of Lord Kelvin's Works.

E. B. WILSON.

*Some Problems of Geodynamics, being an Essay to which the Adams' Prize in the University of Cambridge was adjudged in 1911.* By A. E. H. LOVE. Cambridge (England), University Press, 1911. xxvii+180 pp.

It was not surprising that Love, whose treatise on Elasticity has been the standard for so long, should sometime turn his attention to the difficult applications to geodynamics. He had indeed already printed several papers upon the subject when in 1910 the selection for the Adams' Prize was "Some investigation connected with the physical constitution or motion of the earth." His winning essay is now printed.

The hypothesis upon which the author works is that of isostasy, specialized in such a way as to make it definite. Approximately the hypothesis of isostasy regards the earth