these and observations of sudden magnetic storm commencements, geomagnetic bays, and solar flare effects, it should be possible to study the distribution of conductivity within the earth and thereby "to say something about the temperature distribution and the phase transition supposed at a depth of a few hundred kilometers." However, Rikitake "is of the opinion that in view of the resolving power of existing analyses of transient geomagnetic variations, we can only say that the increase in the conductivity at a depth of several hundred kilometers is very steep."

The last three chapters deal with the effect of the ocean on geomagnetic variations, the advantages and limitations of the "magneto-telluric" method, and local anomalies of geomagnetic variation that indicate lateral inhomogeneities of electrical conductivity within the earth's crust and mantle.

The book can be highly recommended as a clearly presented, comprehensively documented, and well-illustrated summary of the results of the current research in geomagnetism and electromagnetism relating to the interior of the earth.

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Studies in Mathematics Series

Volume 1 in the Mathematical Association of America's "Studies in Mathematics" series, *Studies in Modern Analysis*, was published in 1962. Volume 3, **Studies in Real and Complex Analysis** (Prentice-Hall, Englewood Cliffs, N.J., 1965. 221 pp., $4), edited by I. I. Hirschman, Jr., might be considered a continuation of volume 1, for it makes contact with the subject matter of that book at several points. The second volume, *Studies in Modern Algebra*, was concerned with quite different mathematical material.

In the introduction to volume 1, it was stated that the purpose of the series is "to bring to the general mathematical community expository articles at the collegiate and graduate level on recent developments in mathematics and the teaching of mathematics" in order to help overcome "the communication barrier which has arisen as a natural consequence of the tremendous acceleration in mathematical development that has taken place especially in the last twenty-five years."

If "mathematical community" is interpreted as referring solely to pure mathematicians and collegiate and graduate students of pure mathematics, then these volumes are a great success. The exposition is quite uniformly clear, occasionally delightfully exciting (to a mathematician), and excellent in lending historical orientation and showing the remarkable interplay that frequently exists between seemingly different branches of mathematics.

There is no reason why a particular series of mathematical expositions *should* be addressed to the wider community of scholars and scientists concerned with the applications of mathematics. Pure mathematicians do indeed have a communication—and subject-matter—barrier to overcome, even among themselves. I only want to inform the applied mathematician that he should expect to find applicable, but only very slightly applied, mathematics here.

The editor of the present volume has wisely left to the contributors decisions about how much mathematical background should be assumed, the extent to which details should be given, and so on. Accordingly, there is a wide variation in the length, depth, and style of the articles. Each is useful in its own way and should be judged for what it is, not for what it is not.

H. J. Bremermann traces the interesting and sometimes surprising history of the theory of functions of several complex variables from its inception at the turn of the century. Lawrence M. Graves deals with nonlinear functions from one Banach space to another, in particular with the implicit-function theorem; writers of texts on advanced calculus should perhaps take note. Einar Hille gives a brief introduction to semigroups, with some indication of their many mathematical and physical applications. In a joint article, I. I. Hirschman, Jr., and D. V. Widder discuss the genesis of the real inversion formulas of the Laplace and Stieltjes transforms and show their relation to totally positive matrices and variation-diminishing transforms. H. H. Schaefer gives a detailed treatment of the Lebesgue-Stieltjes integral, in which the theory of measure appears as a byproduct at the end rather than as a basic tool at the beginning. Guido Weiss presents the main aspects of classical harmonic analysis and some of the modern theory. Finally, Harold Wisdom discusses the history of a rather special problem, the inversion of semi-infinite Toeplitz operators, showing incidentally how several branches of analysis can become involved in the solution of a single problem.

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Ionospheric Research

The literature dealing with ionospheric research is so large and continues to grow at such a rapid rate that monographs summarizing our knowledge must be gratefully welcomed. R. C. Whitten and I. G. Poppoff have performed a useful service in providing this compact book, **Physics of the Lower Ionosphere** (Prentice-Hall, Englewood Cliffs, N.J., 1965. 240 pp., $7.50). By restricting their volume to that portion of the atmosphere within the height range from 50 to 150 kilometers, they have avoided treatment of many complex studies of the ionospheric F-region and the magnetosphere, and in considering the lower ionosphere, their point of view leans heavily towards a description of the physical and chemical properties of the atmosphere and of the ionization and recombination processes that occur in response to solar radiations.

A summary of the nature of the solar ionizing emissions precedes chapters that treat the pressure and density of the atmosphere and its chemical properties. The production and recombination of ionization are then considered, and material on measurements of atmospheric parameters and ionization profiles is presented. Electromagnetic propagation is discussed in terms of the conductivity equations, with emphasis on collision frequencies. The final chapter provides a brief description of sudden ionospheric disturbances, polar cap absorption, auroral effects, and the perturbations produced by nuclear bursts. Perhaps the following technical words chosen at random from throughout the book will give an impression of the contents: auroral temperature; bombardment; conductivity; photoionization; emission; polarizability; recombination; concentration; particle; collector plates; affinity; data; flux; and photons.

The list of references includes more than 400 items, most concerned with topics close to the author's own in-