BOOK REVIEWS

Electromagnetic theory. (Proceedings of Symposia In Applied Mathematics, vol. 2.) New York, American Mathematical Society, 1950. 2+91 pp. $3.00.

The present book gives an account of the Second Symposium in Applied Mathematics of the American Mathematical Society, held at the Massachusetts Institute of Technology, July 24–31, 1948. It covers all fields of modern development in the electromagnetic theory, ranging from quantum electrodynamics to practical applications of the electromagnetic theory in communication engineering.

H. Feshbach presents in the first paper an excellent and very clear summary of the problems of quantum electromagnetic theory. He explains the advances made in recent years, especially the work of Schwinger on the elimination of infinite terms and the correct discussion of the Lamb-Rutherford correction.

J. L. Synge discusses a problem of importance for general relativity, and investigates how far it may be possible to dissociate electromagnetism from metric definitions. This is a central problem in relativity theory, and it had retained the attention of the late P. Langevin in many of his (unpublished!) lectures at the College de France. Synge's paper goes back to the fundamental definitions and represents a very important contribution to the problem.

W. H. Watson investigates the possibility of introducing discontinuities in the classical electromagnetic theory, and especially a sort of discontinuous motion. The idea is to obtain a translation of Maxwell's theory that could be more easily connected with the quantum statistical methods. This interesting paper shows how such an adaptation of the classical theory can be logically attempted and practically performed.

L. Infeld discusses the factorization method and its application to differential equations in theoretical physics, a very interesting problem on account of the power of the method for practical resolution of problems.

R. J. Duffin treats of nonlinear networks and indicates the method that can be used for such problems.

C. L. Pekeris compares the ray theory to the normal mode method, and shows that they are related by a Poisson transform.

A. E. Heins discusses systems of Wiener-Hopf integral equations and their applications to some boundary value problems in electromagnetic theory.

Other papers, by A. H. Taub, S. O. Rice, A. F. Stevenson, R. Truell
E. G. Ramberg, M. Kac, N. Wiener, Y. W. Lee, H. Wallman, E.
Feenberg, are short abstracts of articles published in different scientific reviews.

L. BRILLOUIN

The real projective plane. By H. S. M. Coxeter, New York, McGraw-
Hill, 1949. 10+196 pp. $3.00.

This book is an admirable introduction to the subject for students
who know a fair amount of ordinary plane geometry, including at
least something about conics, but have no idea at all of projective
geometry. It begins by the introduction of points and the line at in-
finity by means of the "vanishing line" or horizon of a central projec-
tion from one plane onto another, and goes on to illustrate the dis-
tinction between affine and projective geometry by proving De-
sargues' theorem by projection, from the properties of similar and
similarly situated triangles. In the second chapter a set of five axioms
of incidence (one of which is Desargues' theorem) is given, the prin-
ciple of duality explained, and the quadrilateral and quadrangle and
the harmonic relation studied in an elementary manner. The perspec-
tive relation between two lines is defined, likewise its dual (also called
perspective). Chapter III introduces the idea of order, defined in
terms of the separation relations of two pairs of points, and its prop-
erties deduced from six simple axioms, of which one states that order
is invariant under perspective correspondence. The familiar separa-
tion properties of the harmonic relation are very simply deduced.
Then as a temporary expedient Enriques' theorem to the effect that
an ordered correspondence which relates an interval to an interior
interval has a first invariant point in the interval is introduced as an
axiom of continuity.

Chapter IV is on one-dimensional projectivities, defined as cor-
respondences that preserve the harmonic relation. The funda-
mental theorem is proved from the axiom of continuity; Pappus'
theorem and the axis of projectivity follow simply. Projectivities are
classified into direct and opposite according to their effect on sense
and into elliptic, parabolic, and hyperbolic, according to the number
of their invariant points. Involutions are studied, and the involutory
property of the quadrangular set proved.

Chapter V is a similar treatment of two-dimensional projec-
tivities, both collineations and correlations, a collineation being
defined as any point-to-point correspondence that preserves col-
linearity. It is shown from the fundamental theorem that there