SHORTER NOTICES

Integrationsmethoden der Lieschen Theorie. By Dr. Gerhard Kowalewski.
   (Mathematik und ihre Anwendungen, Volume 15.) Leipzig, Akademische
   Verlagsgesellschaft, 1933. viii + 221 pp.

The author restricts himself to a relatively small number of topics, which
he treats with considerable detail and illustrates with numerous well-selected
exercises. He gives the same brilliant treatment and employs the same stimu-
lating style evidenced in his earlier work: *Einführung in die Theorie der kon-
tinuirlichen Gruppen,* Volume 9 of the same series. (For a review of this book,
see this Bulletin, vol. 40 (1934), p. 20.)

There are only two chapters. In the first and much the longer one, the
author considers ordinary differential equations invariant under r-parameter
groups and methods for solving such equations. He develops the theory of in-
variants of r-parameter groups and brings out their use in the problem of solv-
ing differential equations invariant under such groups. He emphasizes clearly
the importance of Lie's determinant Δ, and later extends the use of this im-
portant tool by introducing the *mixed* Lie determinant. Numerous well-chosen
illustrative exercises aid one greatly in following the theory. He does not con-
fine himself to Lie's treatment of these important topics, but gives an account
of his own work and that of his students, either in detail or by reference to
the literature.

In the second chapter the author confines himself to the study and use of
Lie's integrating factor (first announced by Lie in 1874) for an ordinary differ-
ential equation, invariant under a one-parameter group, and to an extension
of this idea to systems of ordinary differential equations of the first order.

The book is decidedly a valuable addition to the available literature on the
topics treated.

ABRAHAM COHEN

Application des Imaginaires au Calcul Vectoriel. By J. B. Pomey. Paris, Gau-
   thier-Villars, 1933. vi+70 pp.

The subtitle is "Complément à la Conférence sur le Calcul Vectoriel."
This course, given at the École Supérieure d'Électricité, deals in part with the
use of complex numbers in vector analysis. The book under review furnishes
material for this part of the course. The author gives various applications of
complex numbers to geometry, kinematics, alternating currents, elliptic vibra-
tions, and the method of symmetric coordinates of Fortescue. There is also a
discussion of Cayley's formula, which sets up a correspondence between the
bilinear transformation of the complex plane and the rotation of a sphere about
a diameter. The book is carefully written and the treatment in several places
is somewhat unusual. It makes stimulating reading for the mathematician and
gives some notion of the kind of mathematics used in electrical engineering.

C. A. SHOOK