ABSTRACTS OF PAPERS

SUBMITTED FOR PRESENTATION TO THE SOCIETY

The following papers have been submitted to the Secretary and the Associate Secretaries of the Society for presentation at meetings of the Society. They are numbered serially throughout this volume. Cross-references to them in the reports of the meetings will give the number of this volume, the number of this issue, and the serial number of the abstract.

103. Dr. E. W. Titt: $(n-1)$-*dimensional characteristic strips and Cauchy's problem for partial differential equations.*

In the present paper the author obtains a Cauchy-Kowalewsky system of first-order partial differential equations equivalent to a second-order partial differential equation in n independent variables. In the case of an analytic equation with analytic data this system of first-order equations solves Cauchy's problem for the second-order equation without the usual transformation of coordinates. The key to the Cauchy-Kowalewsky system is the conception of an $(n-1)$-dimensional characteristic strip. Thus in the case of two independent variables these characteristic strips are one-dimensional. They are in fact the strips of second order found by Goursat, *Leçons sur l'Intégration des Equations aux Dérivées Partielles du Second Ordre,* Hermann, 1896. The idea of an $(n-1)$-dimensional characteristic strip is common to both the first and the second order non-linear partial differential equation. In both cases these strips find application in the problem of determining manifolds for which Cauchy's problem is indeterminate. (Received January 26, 1935.)

104. Mr. Garrett Birkhoff: *Non-commutative integration.*

A constructive theory of integration for functions of a line to a (generally non-commutative) "complete normed vector ring" V is developed, entirely analogous to the author's theory of integration of functions of a space with a Borel ring of measurable sets to a Banach space. The integral is immensely more powerful than the usual product integrals, and specializes to the Denjoy integral (without use of derivatives) in the case V is the real number system. (Received January 19, 1935.)

105. Dr. R. H. Cameron (National Research Fellow): *Linear differential equations with almost periodic coefficients.*

This paper gives new necessary and sufficient conditions that all of the solutions of a system of linear differential equations with almost periodic coefficients should be almost periodic. It also gives new sufficient conditions that a particular solution should be almost periodic. (Received January 24, 1935.)