

ABSTRACTS OF PAPERS

SUBMITTED FOR PRESENTATION TO THIS 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.

1. Dr. D. C. Lewis: *Infinite systems of differential equations with applications to partial differential equations.*

Lichtenstein showed (Journal für Mathematik, 1927) how existence theorems for certain non-linear partial differential equations of hyperbolic type with initial and boundary conditions could be made to depend upon existence theorems for certain infinite systems of ordinary differential equations. In this paper analogous results are obtained for partial differential equations of less restricted type and for more general initial conditions. The gain in generality is principally due to a natural extension of the notion of a solution of a partial differential equation. Such extensions have also been considered for linear equations by N. Wiener, and for Laplace's equation by M. Bôcher. The author proposes the further study of a type of infinite systems, apparently not hitherto considered, of which the following system, arising from the consideration of a stretched elastic string constrained to vibrate transversally, is an example: $d^2x_\alpha/dt^2 + \partial V/\partial x_\alpha = 0$, $\alpha = 1, 2, \dots$, where $V = (1/2) \sum_{\alpha=1}^{\infty} \alpha^2 x_\alpha^2 + (\pi/48) \cdot (\sum_{\alpha=1}^{\infty} \alpha^2 x_\alpha^2)^2 + (\pi/96) \sum_{k=1}^{\infty} (\sum_{\alpha=1}^{k-1} \alpha(k-\alpha)x_\alpha x_{k-\alpha} + 2 \sum_{\alpha=1}^{\infty} \alpha(k+\alpha)x_\alpha x_{k+\alpha})^2$. (Received November 23, 1932.)

2. Dr. C. E. Rhodes: *Concerning the double Poisson integral and its derivatives.*

The single Poisson integral defines a function, $F(r, x)$, throughout the interior of the unit circle, which, under proper conditions, approaches an arbitrary given function, $f(x)$, along the boundary. Fatou has established (Acta Mathematica, vol. 30, pp. 335-400) certain sufficient conditions that the partial derivatives F_x and F_{xx} should approach respectively $f'(x)$ and $f''(x)$, as the point (r, x) approaches the boundary of the circle. The present paper considers the analogous situation for the function $F(r, \rho, x, y)$ defined by the double Poisson integral. Sufficient conditions that the partial derivatives $F_x, F_y, F_{xy}, F_{xx}, F_{yy}$ shall approach respectively $f_x, f_y, f_{xy}, f_{xx}, f_{yy}$, as r and ρ approach 1, are found. In order to insure the proper behavior of the double integral over a cross-region about the point under consideration, an additional condition is used which has no analogy in the case of the single Poisson integral. (Received November 28, 1932.)