INFORMATION

L. É. Reiziņš

1966

SovietRxiv

Abstract

Full Text

INFORMATION

ANNIVERSARY READINGS DEDICATED TO THE CENTENARY OF THE BIRTH OF THE LATVIAN MATHEMATICIAN PIERS GEORGIEVICH BOHL

From October 21 to 23, Anniversary Readings dedicated to the centenary of the birth of the outstanding Latvian mathematician Piers Georgievich Bohl were held in Riga. About 140 participants from Riga, Moscow, Leningrad, Kharkov, Tartu, Samarkand, Kishinev, Kiev, and Gorky took part in the readings.

The meeting was opened by the chairman of the organizing committee, Prof. A. Ya. Lusis. On behalf of the Division of Physical and Technical Sciences of the Academy of Sciences of the Latvian SSR, those assembled were greeted by Corresponding Member of the Academy of Sciences of the Latvian SSR I. M. Kirko. A report on the work of P. G. Bohl was delivered by A. D. Myshkis. He noted that Bohl put forward many fruitful ideas and carried out his investigations by entirely modern methods, which have not lost their significance even at the present time; only the style of presenting the results may today seem somewhat cumbersome. Bohl was the first to study quasiperiodic functions, which constitute a most important subclass of the class of almost periodic functions introduced by H. Bohr 32 years later; moreover, Bohl proved one of the central theorems in this area, on the quasiperiodicity of a bounded antiderivative of a quasiperiodic function. He applied the results obtained to the study of the structure of the general solution of a second-order linear equation with quasiperiodic coefficient and right-hand side.

Bohl was one of the pioneers of qualitative methods in mathematical analysis and celestial mechanics, applying these methods in a form characteristic of later investigations. He was the first to study the structure of the collection of one-sided and two-sided bounded solutions in a small neighborhood of the zero solution of a linear system with constant coefficients perturbed by small nonlinear additions. In order to "capture" these solutions and to prove the continuous dependence of a two-sided bounded solution on the additions for arbitrary nonzero real parts of the characteristic roots of the original equation, Bohl used a method whose significance was later shown in a general form by Hadamard. In another work Bohl carried out an analogous investigation of an autonomous mechanical system without energy dissipation, if the force function near the equilibrium position, up to small terms of higher order, is a nondegenerate quadratic form of arbitrary signature. In this way Bohl opened an approach to the study of the neighborhood of an unstable equilibrium in the general case, anticipating later results of a number of authors.

These investigations of Bohl are based on the first applications by him of topological considerations, which are now already customary. It was Bohl who first recognized the significance, for existence theorems in mathematical analysis, of two fundamental theorems of topology proved by him and widely known at the present time, one of which asserts the impossibility of "removing the sphere from itself," while the other is a paraphrase of the theorem on the existence of a fixed point under a continuous mapping of a ball into itself. (The latter theorem was proved six years later independently by L. Brouwer.) Along the way Bohl gives, without proof, the formulation of a third basic topological theorem on the existence of a fixed point for a homeomorphic identity continuous mapping of a sphere of even dimension into itself, and points out the possibility of applying this theorem.

Bohl was the first to investigate the behavior of an approximate solution on a half-axis of a system of differential equations satisfying this system with a prescribed degree of accuracy, pointing out the significance of this question for natural science. This investigation is directly connected with the problem of the stability of a solution with respect to perturbation of the right-hand sides of the system and, on the other hand, anticipates the theory of "equations in contingencies."

Studying the problem of mean motion in celestial mechanics, Bohl, a year before Sierpiński and H. Weyl, first proved the remarkable theorem on the uniform distribution of fractional parts, which is one of the first theorems of ergodic type and which at the present time plays a very substantial role in mathematics and theoretical physics. In the problem of mean motion itself, Bohl discovered an entirely new aspect, namely the dependence of a positive or negative solution of problems on the arithmetic properties of the set of given parameters.

It is difficult to enumerate all of Bohl' s new ideas that are widely popular at the present time. These include the "coefficient freezing" method for a linear system, the extraction of a single-valued branch from a multivalued mapping, the application of inequalities between derivatives of different orders, and much else.

The report was supplemented by I. M. Rabinovich with certain episodes from the life of P. G. Bohl and a demonstration of illustrations.

Let us note that a description of Bohl' s life and a survey of his research can be found in the booklet by A. D. Myshkis and I. M. Rabinovich, *The Mathematician Piers Bohl from Riga*, published during the days of the conference by the Riga publishing house "Zinatne," but, unfortunately, in a small print run.

At the first session of the readings, devoted to questions of P. G. Bohl's scientific work, the following reports were also presented:

E. E. Tamme. On P. G. Bohl' s first scientific work, "Theory and Applications of Invariants of Linear Differential Equations."

A. U. Bunga. P. G. Bohl' s activity at the Riga Polytechnic Institute.

E. Ya. Bakhmutskaya. V. L. Kirpichev on P. G. Bohl' s teaching activity at the Riga Polytechnic Institute in the 1890s (read by I. M. Rabinovich).

I. M. Rabinovich read M. M. Botvinnik' s commentary, "On P. G. Bohl' s Chess Game."

The second session was devoted to the theory of almost-periodic functions. The following reports were presented:

B. M. Levitan. The Bohl–Bohr theorem on the integration of almost-periodic functions.

B. M. Levitan, V. V. Zhikov. The present state of the theory of almost-periodic functions.

V. V. Zhikov. Abstract almost-periodic differential equations.

The third session was devoted to the theory of ordinary differential equations. The following reports were heard:

I. S. Kukles, R. Yu. Akchurina. Problems of distinction in three-dimensional space.

Yu. A. Klokov. Boundary-value problems for systems of ordinary differential equations of second order.

A. Ya. Lepin, A. D. Myshkis. Existence of a solution of one boundary-value problem for ordinary differential equations of order n.

L. E. Reizin. Topological equivalence of systems of differential equations.

At the fourth session the following reports on celestial mechanics were heard:

V. A. Brumberg. Construction of a generalized planetary theory.

G. A. Merman. Proof of the existence of almost-periodic solutions in a neighborhood of stable periodic solutions of a canonical nonautonomous system with one degree of freedom.

V. I. Skripnichenko. The mean motion of the perihelion and node in the trigonometric theory of secular perturbations.

E. A. Grebenikov. Some questions of qualitative celestial mechanics connected with the averaging method.

M. S. Yarov-Yarovoy. On constructing a theory of the Moon' s motion over short intervals of time.

K. A. Shtein. Research in celestial mechanics in the Latvian SSR.

The concluding session was devoted to surveys of the work of Estonian and Latvian mathematicians. The following survey reports were heard:

Yu. G. Lumiste. Achievements of mathematicians in Soviet Estonia.

T. Syrmus and E. Yurimäe. Works of Tartu mathematicians in the field of the theory of summation of series.

E. I. Ariņš. On the work of the Computing Center of P. Stučka Latvian State University.

E. Ya. Riekstiņš. Research on function theory in the Latvian SSR.

L. I. Rubinshtein. Research on the theory of equations of mathematical physics in the Latvian SSR.

L. E. Reizin. Research on the theory of ordinary differential equations in the Latvian SSR.

B. I. Plotkin. Research on algebra in the Latvian SSR (read by L. I. Sīmonyan).

In conclusion, a proposal was adopted to organize the publication of the works of P. G. Bohl in Russian. Those assembled sent a greeting telegram to I. Ya. Depman, the initiator of the study of P. G. Bohl' s creative work.

L. REIZIN,
deputy chairman of the organizing committee

Note: Figure translations are in progress. See original paper for figures.