Michal Greguš

Prof. RNDr. Otakar Borůvka died (1899--1995)

PROF. RNDR. OTAKAR BORŮVKA DIED

A distinguished Czech mathematician Prof. RNDr. Otakar Borůvka, DrSc., Dr. h.c. of Masaryk University in Brno, of Comenius University in Bratislava, honourable member of the Union of Czech and Slovak Mathematicians and Physicists, honourable citizen of the city of Brno and of Uherský Ostroh, holder of many distinctions of leading European universities, died on July 22, 1995 at the age of 96 years.

He was born in a teacher's family in Uherský Ostroh on May 10, 1899 and brought up with a close bond to akin Slovak nation. He never forgot his upbringing and, at the period after the Second World War, when the Slovak mathematics was at its beginnings, he was for more than 10 years travelling from Brno to Bratislava to lecture at the Comenius University. Especially, due to his efforts, there where laid down foundations for the further development of mathematics in Slovakia, in particular in Geometry, Algebra and Differential Equations.

The core of scientific work of Professor Borůvka accomplished at the Faculty of Science of Masaryk University and the Mathematical Institute of the Czech Academy of Sciences in Brno consists of three parts. He wrote about 80 papers and monographs,[1] especially in the fields of Differential Geometry, modern Algebra as well as of Differential Equations, and contributed to each of these branches results of world standards. His scientific comprehensiveness proved to be of advantage for his work as it enabled him to gain not only a very original approach to the solution of problems, but also a deep and detailed treatment discovering the essence of the matter. In this short article, we will only recall the most significant features of the work of Professor Borůvka.

Geometry. Čech's results about the contact of two curves form in substance the starting point of his study of correspondences between two projective spaces. His results about analytical correspondences between two projective planes and determination of the so called characteristic directions of the correspondence in the considered point was very instructive for other geometrical schools. Borůvka's works on the theory of correspondences, besides their indisputably high level, have yet another importance, consisting in the use of Cartan methods, and so he contributed in a high degree to their extension.

Further, Professor Borůvka has built a general theory of the normal curvature of a surface in an n-dimensional space with constant curvature, based on the notion of the indicatrices of normal curvature.

---

[1]For the scientific publications of O. Borůvka see:

[1–46] Časopis Pěst. Mat. **84** (1959), 248–250.

[47–63] Časopis Pěst. Mat. **94** (1969), 244–247.

[64–80] Časopis Pěst. Mat. **104** (1979), 219–220,
also Czechoslovak Math. J.**29(104)** (1979), 330–335.

[81–82] Časopis Pěst. Mat. **109** (1984), 217–220,
also Czechoslovak Math. J. **34(109)** (1984), 488–489.

[83–84] Časopis Pěst. Mat. **114** (1989), 210–213,
also Czechoslovak Math. J. **39(114)** (1989), 382–384.

Algebra. The beginnings of algebraic research of Professor Borůvka go back to the time when the attention of algebraists was concentrated on the research of special algebraic structures, e.g., of groups, rings and fields, and, when algebraists began to realize the transfer from known structures to more general structures. It was Otakar Borůvka who considerably aided in the victory of these new tendencies in algebra. His principal work, based on a number of previous papers, is the German monograph "Grundlagen der Gruppoid- und Gruppentheorie" (Berlin, 1960) and its Czech version (1962). A groupoid is here intended to mean a non-empty set with a binary operation defined for all ordered pairs of elements. This monograph contains an extensive theory of groupoids enriched with results, which generalize the theories of basic algebraic structures, e.g., semigroups and groups. The theory of groupoids was a model for the formation of the theory of general algebras.

Differential equations. A substantial part of the scientific work of Professor Borůvka is the study of ordinary differential equations. He achieved fundamental results in the theory of linear differential equations predominantly of the second order with respect to the distribution of zeros of solutions and their derivatives.

In this theory, he introduced certain functions, so called dispersions and built up the whole theory of these functions. In a close continuity with theory of dispersions, Borůvka's global transformation theory of the second order linear differential equations was developed. The basic monograph of this work was published in Berlin, 1967, as "Lineare Differentialgleichungen 2. Ordnung."

Other his results on ordinary differential equations relate to the systems of linear differential equations with constant coefficients (Weyer's Theory of matrices and its applications). Further important result consists in the discovery of a very general criterion of uniqueness of solutions to the differential equation $y' = f(x, y)$. At the end of this short information, it is necessary to mention that Professor Borůvka also wrote some papers from the Theory of the Γ-function (as an assistant of M. Lerch), and it was Professor Borůvka who first (1926) formulated and solved the problem of determining the greatest connected subgraph of a minimal length, too. And so, he has preceded the important problems of the theory of graphs by twenty years.

The life activity of Professor Borůvka at the Czech and Slovak universities influenced to a large extent, the development of mathematics in Czech and Slovak republics. His outstanding capacities and his incredible working enthusiasm gained a number of younger mathematicians for scientific work by inspiring them to an independent creative activity in different domains of mathematics.

The mathematical community in Slovakia will never forget his contribution to the development of mathematics.

Michal Greguš