MIROSLAV FIEDLER PASSED AWAY

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Professor Miroslav Fiedler, an outstanding Czech mathematician and university teacher, passed away on November 20, 2015. Two of his publications undoubtedly belong among his most notable and most cited: paper Algebraic connectivity of graphs (Czechoslovak Math. J. 1973) and book Special matrices and their applications in numerical mathematics (1986).

Miroslav Fiedler was born on April 7, 1926 in Prague. After having finished his study of mathematics and physics at Charles University in Prague and having received his RNDr. (rerum naturalium doctor) degree in 1950, he continued as research student and later research worker at the Mathematical Institute of the Czechoslovak Academy of Sciences in Prague. Influenced by one of his teachers, geometer B. Bydžovský, Fiedler choose for his CSc. (PhD) thesis a remarkable geometric topic: simplices in an n-dimensional Euclidean space (defended 1955).

In 1954, the long and fruitful collaboration of Miroslav Fiedler with Vlastimil Pták began. The first common topic they investigated was iterative methods for solving linear algebraic systems. The study of the dependence of the rate of convergence of the Gauss–Seidel iterative method for a symmetric system on the choice of splitting led to further topics. Independently of other researchers, Fiedler and Pták invented the notion of generalized norms. In several periods of Fiedler's life, they also studied various resemblances between the class of positive definite matrices and M-matrices.

Fiedler received his DrSc. (Doctor of Science) degree in 1963, was appointed a full professor of mathematics at Charles University in Prague in 1965, and was elected corresponding member of the Czechoslovak Academy of Sciences in 1981.

Fiedler's scientific activity can be divided into several mutually connected fields: numerical algebra, theory of matrices, geometry, and graph theory. His geometric intuition and ability of predicting and proving surprising connections of many algebraic and graph theoretical problems formed the core of his research method.

Let us review briefly some of Fiedler's topics of interest in linear algebra. With Pták they studied and characterized the class of diagonally dominant matrices and a new class of weakly diagonally dominant matrices. Fiedler was always interested in questions connected with Hermitian and positive definite matrices, in particular in bounds for the eigenvalues and other inequalities. He also proposed and solved one of the first variants of the completion problems when he characterized two

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n-tuples of positive numbers that can be diagonal entries of two mutually inverse positive definite matrices or of an M-matrix and its inverse.

Another his contribution was to prove a bound on the determinant of the sum of two Hermitian matrices in terms of their eigenvalues, which was closely related to more general Oliviera's conjecture, and also reprove Horn's condition characterizing the relation between eigenvalues and diagonal elements of a symmetric matrix.

Fiedler contributed to the problem of characterization of n-tuples of eigenvalues of nonnegative matrices and to the theory of positive operators on cones. He also defined a measure of irreducibility for nonnegative matrices and used it to replace the qualitative jump from irreducible matrices to reducible by a continuous quantitative change.

A topic for application of his geometric background was the study of geometric properties of the numerical range $W(A) = \{(Ax, x) \mid (x, x) = 1\}$ of a matrix A in the Gaussian plane.

From the eighties Fiedler published (partially with Pták) a series of papers on Hankel, Vandermonde, Toeplitz, Bézout, and Loewner matrices. Their approach was based especially on the connection with polynomial and rational interpolation. Among other properties, they studied intertwinning relations of Hankel and Bézout matrices with the associated companion matrix and its transpose.

Fiedler's research work extended to the field of electrical networks when he was solving a particular interesting problem. This was the problem of determining mutual resistances between all pairs of n outlets of a resistance electrical network. He proved that this problem is one of models mutually isomorphic with the geometry of simplices, matrix theory, and graph theory.

Fiedler's scientific work soon won a world reputation. He also became a member of editorial boards of several distinguished journals: Linear Algebra and Its Applications, Linear and Multilinear Algebra, Mathematica Slovaca, and Numerische Mathematik. He was the Editor-in-Chief of the Czechoslovak Mathematical Journal since 1971.

My life chance to get closer to Professor Fiedler arose when a colleague of mine, Petr Přikryl, and I were translating Fiedler's book Special matrices and their applications in numerical mathematics to English. The first version of the book appeared in Czech and we were working on its translation, naturally in cooperation with the author. We got acquainted with Fiedler's always smiling but at the same time energetic face. In any situation, Miroslav Fiedler was a gentleman.

Miroslav Fiedler was employed at the Institute of Mathematics of the Czechoslovak (later Czech) Academy of Sciences for his whole life. For many years he was Chair of the Department of Mathematical Logic, Numerical Algebra, and Graph Theory of the Institute. After his retirement in 1992 he had a part time job in the Institute as well as the Institute of Computer Science of the Czech Academy of Sciences in Prague.

Besides his research work, Fiedler was also a perfect university teacher and gave lectures not only in Prague but also in Bratislava and Košice (Slovakia). He also mentored PhD students and stayed abroad to teach at several universities. For more than fifty years he was active in the organization of the national Mathematical Olympiad for secondary school students.

The list of Professor Fiedler's honors would be long. Let us mention at least the most important of them: National Prize of the Czech Republic (together with V. Pták) from the Government in 1978, Honorary Membership in the Union of Czech Mathematicians and Physicists in 1985, gold Bernard Bolzano Medal from the Czechoslovak Academy of Sciences in 1986, Hans Schneider Prize from the International Linear Algebra Society in 1993, Fellowship in the Learned Society of the Czech Republic in 1997, Medal of Honor *De scientia et humanitate meritis* from the Czech Academy of Sciences in 2006, Medal of Merit for service to the Czech Republic from the President in 2007, Neuron Award for Contribution to Science from the Neuron Foundation for Support of Science in 2012.

Professor Fiedler's merits for mathematics in general and Czech mathematics in particular are remarkable. He will be long remembered as one who devoted his life to mathematics.