

# Applications of Mathematics

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Professor Michal Křížek, Editor-in-Chief of Applications of Mathematics, is sixty

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PROFESSOR MICHAL KŘÍŽEK,  
EDITOR-IN-CHIEF OF APPLICATIONS OF MATHEMATICS,  
IS SIXTY

The first issue of Applications of Mathematics (then Aplikace matematiky) appeared in the beginning of 1956. In those days, today's Editor-in-Chief was hardly four years old and nothing indicated that his and the journal's life trajectories would ever meet or even interweave. The former happened exactly thirty years ago when Michal Křížek published a paper in Aplikace matematiky for the first but not last time. The latter started in 1993 when he was appointed a member of the Editorial Board. The bond has further strengthened as he became Associate Editor-in-Chief in 2004 and Editor-in-Chief five years later.



Michal Křížek was born in Praha (Prague), Czechoslovakia, on March 8, 1952. He studied numerical analysis at the Faculty of Mathematics and Physics of Charles University in Prague, and received his MS degree in 1975 and RNDr. degree in 1977. He completed his PhD study at the Mathematical Institute of the Czechoslovak

Academy of Sciences (now Institute of Mathematics of the Academy of Sciences of the Czech Republic) in 1980, obtained the PhD degree (then called CSc. degree) and started his research work at the Mathematical Institute, where he is now at the post of senior research scientist.

He received the DrSc. degree from the Czechoslovak Academy of Sciences in 1992. At Charles University, he was appointed Associate Professor (docent) in 2000 and Professor in 2003. Let us note that Associate Professor and Professor mean in Central Europe not only a university position but also an academic title. The title of Professor is granted by the President of the Republic in this country.

Research interests of Michal Křížek are extraordinarily broad and include more than twenty sometimes very distant fields and branches of mathematics, physics, and astronomy. Let us name at least some of them. Historically the first subject of his interest in mathematics was optimization and nonlinear programming.

However, it was his mentor Ivan Hlaváček who introduced him to the finite element method. Ivan Hlaváček has been working in the finite element method for many years and is a world-known researcher in variational principles, Korn's inequalities, problems with uncertain data, and a variety of other fields. Since then Michal Křížek and Ivan Hlaváček work together and so far they published 18 joint papers.

The finite element method and its various aspects became the major subject of Michal Křížek's professional interest. Let us mention solving Maxwell's equations, the biharmonic equation, nonlinear partial differential equations, and problems of mathematical physics in general. Further areas of the finite element method investigated by Professor Křížek include construction of basis functions, variational crimes, superconvergence, shape optimization, grid generation and local refinement, methods for solving linear algebraic systems, etc.

Good knowledge of geometry and perfect space imagination have been his prerequisite for solving some problems in 3D finite element grid generation and local refinement. His results in this field are mostly connected with tetrahedra and their survey is given on his site [www.math.cas.cz/~krizek](http://www.math.cas.cz/~krizek). You can find even some more facts of interest there, e.g. his favorite open problems that also include face-to-face partitioning of polyhedra into acute tetrahedra or looking for space fillers in  $R^d$ .

During the last fifteen years, new subjects entered the range of Michal Křížek's research. He works intensively in number theory and its connections to geometry. He publishes significant results about simplices, Fermat numbers, Mersenne and Sophie Germain primes, etc. Moreover, he contributes substantially to astronomy and cosmological topology by investigating the connection of gravitational aberration and dark energy. He is an expert on the mathematical background of the Prague astronomical clock mechanism and, recently, he has been attracted by the mathematical aspects of DNA coding.

In addition to his more than 150 scientific papers, he has published also several monographs about the finite element method and number theory in English and several monographs in Czech, too. Many of his publications have a co-author or co-authors, which confirms that he has a wide range of interests and a lot of friends he collaborates with. He was a co-editor of many proceedings from international conferences. He records more than 1500 citations (without self-citations and self-citations of co-authors), his Hirsch index is 20, and his Erdős number is 2. His work M. Křížek, P. Neittaanmäki: On superconvergence techniques, which appeared in *Acta Appl. Math.* in 1987, has been cited more than 180 times.

His deep knowledge of computational mathematics was an important factor in the cooperation of the Institute of Mathematics with several Czech industrial enterprises in solving various engineering problems.

Michal Křížek is intensively engaged in popularization of science among students as well as general public. He writes and translates papers to various Czech journals and reads popular lectures. The history of mathematics, physics, and astronomy is also his hobby.

Professor Křížek was and is a mentor to many PhD students. He also carries out a lot of activities in the organization of science. He is the Head of Department of Constructive Methods of Mathematical Analysis at the Institute of Mathematics. He also used to work as the Chair of the Scientific Council of the Institute of Mathematics.

He is not only the Editor-in-Chief of this journal, *Applications of Mathematics* with 2010 impact factor 0.390, but also of the Czech journal *Advances of Mathematics, Physics and Astronomy* published by the Union of Czech Mathematicians and Physicists. Moreover, he is a member of editorial boards of further international journals.

Professor Křížek is a highly and internationally recognized scientist. He maintains close contacts with many researchers all over the world and has been invited to read lectures at many universities and conferences. He has been awarded several medals and honors, from Prize of the Academy of Sciences of the Czech Republic in 1994 and Prize for Research Achievements of the Minister of Education, Youth, and Sports of the Czech Republic (1996) to Josef Hlávka Prize in Scientific Literature (2010). Michal Křížek was elected to the Learned Society of the Czech Republic (2000) and to the Hall of Fame for Engineering, Science and Technology (International Technology Institute, San Diego, California, 2001).

Both Professor Křížek's parents, his father Milan Křížek and his mother Věra Eva Křížková (Šofrová), studied mathematics and physics at Charles University in Prague and so did his grandfather, Bedřich Šofr. Michal Křížek and his wife Lea have two sons, Pavel and Filip, who received their respective PhD degrees in artificial

intelligence and nuclear physics. The fancy for mathematics and physics can thus be considered a “family predestination”.

Michal Křížek’s colleagues in this country as well as abroad know him as a very modest and diligent scientist. It is hard to guess where he takes the time to carry out all his numerous activities. It is our honor and privilege to congratulate him to his 60th birthday. He deserves our sincere wishes of good health, persistently optimistic mind, personal happiness, and further scientific achievements.

On the occasion of Professor Křížek’s anniversary, the Institute of Mathematics of the Academy of Sciences of the Czech Republic organizes the international conference Applications of Mathematics 2012 in Prague on May 2–5.

*Karel Segeth*