Karel Segeth
Preface

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PREFACE

I guess that it was in 1976 when the Director of the Mathematical Institute of the Czechoslovak Academy of Sciences appointed me a member of an Admission Committee as a young mathematician asked him for a job. I carefully prepared my question for the admission procedure. It was rather from programming languages than from mathematics and I remember it till now: What is the difference between the parameters of a subroutine called by name and by value? The applicant's reply was correct, he had no problems with answering other questions of the Committee members either, and the Committee recommended the Director to sign a contract with him. This applicant was Michal Křížek, whose sixtieth birthday we celebrate at this Conference, Applications of Mathematics 2012.

Michal Křížek was born in Prague (Praha), 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 finished his PhD studies 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 (called CSc. degree at that time) and started his research work at the Mathematical Institute, where he is now at the post of senior research scientist.

He received his 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. Like in some other Central European countries, Professor is not only a university post but also an academic title. In the Czech Republic, the title of Professor is granted by the President of the Republic.

During his PhD studies at the Mathematical Institute, Michal Křížek got thoroughly acquainted with the finite element method and he remains faithful to the method though his research interests are extraordinarily broad. They include many sometimes very different fields and branches of mathematics, physics, astronomy, and biology. He is not only interested in these fields but he also successfully published results in them.

Let us name at least some of these branches. Historically the first subjects of his interest in mathematics were the theory of optimal control, optimization, and nonlinear programming. The finite element solution of Maxwell's equations, the biharmonic equation, nonlinear partial differential equations, and problems of mathematical physics in general, follow. 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, and methods for solving large systems of linear algebraic equations.

A detailed view of Michal Křížek's professional interests can be found on his personal website `www.math.cas.cz/~krizek` where he presents his list of publications as well as his favourite open problems. Moreover, the authorized list of his publications follows in this volume of Proceedings. Good knowledge of geometry and perfect space imagination have been Professor Křížek's prerequisite for solving some problems in 3D finite element grid generation and local refinement. His results in this field are mostly connected with tetrahedra. His beloved open problems also include face-to-face partitioning of polyhedra into acute tetrahedra. He has proven that there is no face-to-face partition of the five-dimensional Euclidean space into acute simplices.

In the last years, new subjects have 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. The unusual width of his scientific interests can be demonstrated with his recent papers discussing 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 and frameshifted stop codons.

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 considerably engaged in popularization of science among students as well as adults. 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 has been reading lectures for students at several Czech univer-

sities, in particular at Charles University and Czech Technical University in Prague. He has been a mentor to several PhD students. Some of them have already reached remarkable success in computational mathematics. In addition to his work of researcher and teacher, Michal Křížek also carries out a lot of activities in the organization of science. He is the Head of the 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 (1996–2003). He is the Chair of the Commission of the Academy of Sciences for granting the scientific degree Doctor of Science in mathematical analysis and related fields.

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 to collaborate with. He was a co-editor of many proceedings from international conferences. His records show more than 1 500 citations (without self-citations and self-citations of co-authors), his Hirsch index is 20, and his Erdős number is 2. The paper M. Křížek, P. Neittaanmäki: *On superconvergence techniques*, which appeared in Acta Appl. Math. in 1987, has been cited more than 180 times.

Michal Křížek became Associate Editor-in-Chief of *Applications of Mathematics* in 2004 and Editor-in-Chief five years later. The journal was founded as *Aplikace matematiky* by Ivo Babuška in 1956 and is published, with the current impact factor 0.390, by the Institute of Mathematics. In addition, Professor Křížek is also Editor-in-Chief 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 other 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. The number of grants he has obtained, jointly with his colleagues, from Czech as well as U.S. grant institutions, confirm that his work is valued very highly.

He has been awarded several medals and honors, e.g. the Prize of the Academy of Sciences of the Czech Republic in 1994, the Prize for Research Achievements of the Minister of Education, Youth, and Sports of the Czech Republic (1996), the Prize of the Academy of Sciences of the Czech Republic for Popularization of Science (1998), the Achievement Award of the Union of Czech Mathematicians and Physicists (1999), the Prize of the President of the Military Academy in Brno for Scientific Achievements (2003), and the 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). He was also elected a member of the Czech Minds Society (2003) and a Merited Member of the Union of Czech Mathematicians and Physicists (2006).

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 finds the time to carry out all his numerous activities we have mentioned above. It is our privilege and honor to congratulate him sincerely on his 60th birthday. We wish him personal happiness, strong health, an optimistic mind, and, last but not least, further scientific achievements.

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This book contains both scientific papers (that have been peer-reviewed) and stories about personal experiences with Michal Křížek, all collected to honor Professor Křížek on the occasion of his 60th anniversary and dedicated to him. Some of the papers have been orally presented at the Applications of Mathematics 2012 Conference organized by the Institute of Mathematics of the Academy of Sciences of the Czech Republic and held in Prague on May 2–5, 2012. The Organizing Committee consisted of J. Brandts, J. Chleboun, S. Korotov, Q. Lin, P. Přikryl, K. Segeth, J. Šístek, A. Šolcová, and T. Vejchodský. Special thanks belong to Hanka Bílková for the typeseting and to Aihui Zhou for providing the picture used on the cover. The Committee is grateful to all authors for their contributions and to the Grant Agency of the Academy of Sciences of the Czech Republic for financial support through Grant IAA 100190803. The Conference was also supported by RVO: 67985840.

Karel Segeth, on behalf of the Organizing Committee