Applications of Mathematics

Karel Segeth
Professor Ivo Babuška is eighty
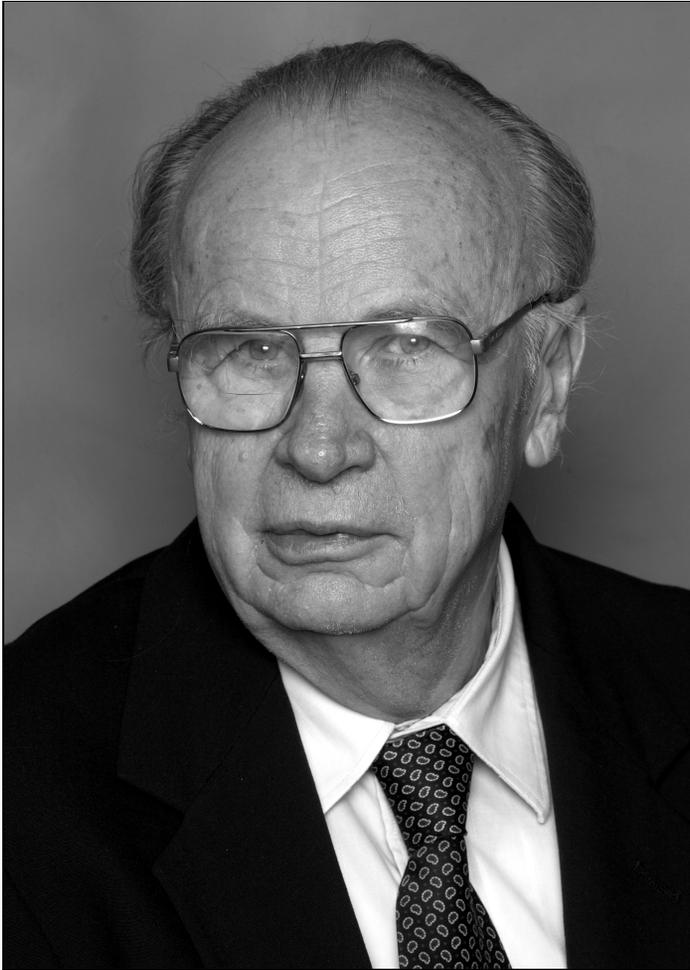
PROFESSOR IVO BABUŠKA IS EIGHTY

Photo courtesy of Charlie Fonville

Ten years ago, the Czechoslovak Mathematical Journal [2] wrote: "Though it may seem rather unbelievable, always agile and active Professor Ivo Babuška celebrated his seventieth birthday in March." Today I can write the same statement, except for

the change of the numeral from 70 to 80. Let me recall Ivo Babuška's biographical data only very briefly. In addition to papers [1], [2], etc., his home page [3] including his bibliography is available.

Ivo Babuška was born on March 22, 1926 in Praha (Prague), Czechoslovakia. He studied civil engineering at the Czech Technical University in Prague, and received the MS (Ing.) degree in 1949 and the PhD. degree in Technical Science (Dr. tech.) in 1951. His tutor was Professor F. Faltus. In the period 1949–1952, he studied mathematics at the Central Mathematical Institute in Prague as a graduate student of Professor V. Knichal and since 1951 he was a research fellow at the Institute. The Institute changed its name to the Mathematical Institute of the Czechoslovak Academy of Sciences in 1953 (now the Mathematical Institute of the Academy of Sciences of the Czech Republic).

In 1955 Ivo Babuška received the PhD. (CSc.) degree in Mathematics and in 1960 the D.Sc. (DrSc.) degree which was in Czechoslovakia (and still is in the Czech Republic) awarded for the highest scientific achievements. From 1955 to 1968 he was head of the Department of Constructive Methods of Mathematical Analysis (originally named the Department of Partial Differential Equations) of the Mathematical Institute of the Czechoslovak Academy of Sciences.

His first important computational achievement dates back to 1953–1956 when he was leader of a numerical group that analyzed technology of the construction of the 91 meter high gravitational Orlík Dam on the Vltava River in Bohemia. The mathematical problem was to solve a nonlinear partial differential equation. Let me point out that all the computations (the guess is about 3 million arithmetic operations) were carried out by a team of people on mechanical desk calculators since no better devices were then available.

The mathematical and numerical problems treated in the project provided many fruitful research topics and initiated the establishing of a general theory of numerical stability of algorithms.

In 1956, Ivo Babuška established this Journal, Applications of Mathematics (formerly Aplikace matematiky) in Prague. He was one of the founders of international scientific meetings that have taken place up to now. The first international EQUAD-IFF Conference on Differential Equations was held in Prague in 1962 and the first international Conference on Basic Problems of Numerical Analysis in Liblice (Czechoslovakia) in 1964.

Ivo Babuška was appointed professor at Charles University in Prague in 1968. The same year he arrived in the United States and became a visiting, later research professor at the Institute for Physical Science and Technology and the Department of Mathematics of the University of Maryland at College Park. His interest in applied and numerical analysis brought him to the finite element method. He has achieved

numerous excellent results in the method itself, in its *hp*-version, in its reliability, a priori and a posteriori estimates, and adaptive approaches, which have been recognized all over the world and belong to the fundamentals of the method. Moreover, Ivo Babuška is known for Babuška's paradox, the Babuška-Brezzi inf-sup condition, minimum angle condition, homogenization etc.

Ivo Babuška is one of the founders of the Finite Element Circus, an informal meeting which, for more than 30 years, has taken place twice a year. He is a member of editorial boards of numerous mathematical and engineering journals.

After leaving Prague, Ivo Babuška remained in scientific contact with his colleagues in Czechoslovakia. Since 1990 he could resume visiting Prague and he has come almost every year. In 1994, he established the Prize for Young Czech Scientists in the field of numerical analysis and computational mechanics that is awarded annually.

In 1995, Ivo Babuška became a senior research scientist and Robert Trull Professor at the Institute for Computational Engineering and Sciences at the University of Texas at Austin.

Along with his other activities, he has been involved in mentoring several tens of graduate students. He has many bright mathematical ideas in his head and he does not keep them for himself. He has always been giving and gives these ideas to his colleagues and students and, moreover, he knows how to fill people with mathematical enthusiasm.

He has received recognition and various awards for his scientific work. A brief supplement to the list of his honours obtained before 1996: Honorary Doctor of Science at Charles University, Prague, Czech Republic (1997), Fellow of the U.S. Association of Computational Mechanics (1997), Honorary Foreign Member of the Czech Learned Society (1998), Honorary Doctor, Helsinki University of Technology, Finland (2000), Honorary Editor of Appl. Math. (2003), Honorary Editor of Numer. Math. (2003), asteroid 36060 named Babuška (2003), Member of the National Academy of Engineering (2005), Member of the Academy of Medicine, Engineering, and Science of Texas (2005), Honorary Diploma of the Czech Society of Mechanics (2005), Honorary Medal De scientia et humanitate optime meritis, the highest award granted by the Academy of Sciences of the Czech Republic (2005).

Ivo Babuška's name is inseparably connected with the development of the finite element method. His theoretical results are widely used, directly or indirectly, in engineering practice. He has been invited to a lot of lectures at conferences all over the world. The list of Ivo Babuška's monographs and papers in Mathematical Reviews contains more than 300 items.

I am sure that Professor Ivo Babuška deserves our congratulations, and our sincere wishes of good health and optimistic mind. The Mathematical Institute of the

Academy of Sciences of the Czech Republic organizes a seminar on this occasion at the end of May, 2006. This is an opportunity to congratulate him personally in Prague and to wish him many further scientific achievements.

In the process of preparation of this special issue of Applications of Mathematics, several Babuška's colleagues and former students have been addressed. The papers in this issue are the result of their efforts to honor Ivo Babuška and his scientific work.

References

[1] *K. Segeth*: Professor Ivo Babuška is seventy. Appl. Math. *41* (1996), 231–232.
[2] *K. Segeth*: Professor Ivo Babuška is seventy. Czechoslovak Math. J. *46* (1996), 351–367.
[3] www.ices.utexas.edu/people/bios/babuska.php.

Karel Segeth, guest editor
(Mathematical Institute AS CR, Prague)