Applications of Mathematics

Libor Čermák; Josef Nedoma; Alexander Ženíšek
In memoriam Professor Miloš Zlámal

NEWS AND NOTICES

IN MEMORIAM PROFESSOR MILOŠ ZLÁMAL

Libor Čermák, Josef Nedoma, Alexander Ženíšek, Brno

On June 22, 1997, a prominent Czech mathematician Professor RNDr. Miloš Zlámal, DrSc., a former member of the Editorial Board of Applications of Mathematics for many years, died unexpectedly at the age of seventy three years.

Miloš Zlámal was born on December 30, 1924 in Zborovice near Kroměříž. He studied Mathematics and Physics at the Faculty of Science of Masaryk University in Brno. He got his doctorate in 1945 and became Assistant Professor at Technical University in Brno. In 1950–51 he was postgraduate student (aspirant) in Mathematical Institute of Czechoslovak Academy of Sciences in Prague and (after his military service) at Faculty of Science of Masaryk University in the years 1952–54. After obtaining the scientific degree of Candidate of Science he remained at the Faculty till 1961, first as Assistant and later Associated Professor (Docent) of Mathematics. Since 1961 his professional career was permanently connected with Technical University in Brno. Here he worked briefly as Associated Professor at Faculty of Mechanical Engineering. During 1963–90 he was director of the Regional Computation Centre and in 1990–95 he was Professor of Mathematics in the Institute of Mathematics of the Faculty of Mechanical Engineering. Even after his retirement he was not able to imagine his life without Mathematics and never stopped coming to the Faculty.

While working at Technical University he obtained in 1963 the degree of Doctor of Science and in 1965 was appointed full professor. In 1980 he was awarded the Bernard Bolzano Silver Medal of the Academy of Sciences, in 1984 the Brno Technical University Golden Medal and doctorate honoris causa at Technical University in Dresden. In 1992 he obtained the Charles University Memorial Medal for his significant contribution to the development and application of the Finite Element Method. In the period 1983–92 he held the Chair of the Scientific Board for Mathematics of Czechoslovak Academy of Sciences.

Prof. Zlámal spent the major part of his extremely fruitful scientific career as head of the Computation Centre of Brno Technical University. Starting from its foundation, he was its director for full 27 years. Originally a small computer centre

developed under his leadership into one of the most important institutes of this kind in the country, and played a considerable role in introducing modern computational methods and the computers themselves into practical use. Prof. Zlámal lectured for a number of years for postgraduate engineering students about the most recent computational methods. More than 30 years he led a seminar for specialists in numerical methods both for Czechoslovak and foreign participants. Prof. Zlámal engaged himself also in the education of a number of young scientists—most of them are now professors or researchers at various institutions of higher education.

As a young mathematician Miloš Zlámal worked in the theory of differential equations, first the ordinary and later the partial ones. Till the year 1967 he published 23 original papers from this field. Among the most important results from that period we should mention the theory of parabolic equations with small parameter at the highest derivative which became the topic of his thesis published in 1960. The most important period of his creative work started when in 1967 he became acquainted, through his collaboration with engineers, with the newly developing Finite Element Method. He published his research concerning the method in 47 papers and his results brought him respect and fame all over the world.

Professor Zlámal was endued with an ability which is not quite common among mathematicians: he had lively interest in problems stemming from engineering practice, was able to listen to engineers, collaborate with them and use their problems as a starting point for his highly scientifically grounded research. So e.g. the topic of his thesis arose from his discussions with Prof. Eng. V. Hálek, DrSc. His first information about the Finite Element Method came from Prof. Eng. J. Kratochvíl, DrSc., from the Faculty of Civil Engineering of Brno Technical University. Prof. Zlámal recognized in the procedure used by engineers certain connections with a half-forgotten paper by R. Courant from 1943 and with variational methods generally. At first he intended to write only a short note on convergence of Veubecke's element, but new ideas and impulses coming in the course of work resulted in the paper "On the Finite Element Method," Numer. Math. 1968, one of the papers most frequently cited in the Finite Element Method.

In his seminar Professor Zlámal gradually formed a group of people fully engaged in the newly expanding Finite Element Method. This gave rise to the Brno school of the method. It had the advantage of being directly connected with the computational practice: algorithms and foundations of software for the method were being developed parallelly with solving mathematical problems. In this direction, programmer's erudition of Eng. Holuša as well as practical experience of Prof. Kratochvíl with the application of the method represented a considerable contribution. The software system was being developed for many years and, besides being used for practical applications, it served also for immediate verification of theoretical results.

The period 1967–73 could be called "the elliptic period" in Zlámal's work in the Finite Element Method. The above mentioned paper in Numer. Math. 1968 started a series of 18 papers which can be considered the best textbook of the Finite Element Method of that time. For example, Prof. Raviart from Paris declared that he had learned the method from Zlámal's early papers.

Since 1973 (except for the period 1977–79 when he analyzed the superconvergence and reduced integration in the Finite Element Method) Prof. Zlámal devoted himself to evolution problems. At first he treated linear parabolic equations, paying special attention to multistep methods. Since 1976 he systematically studied nonlinear problems, first of all again the parabolic equations.

During 1979–82 Zlámal studied mainly the parabolic-elliptic nonlinear equation, which has many applications in the solution of nonlinear magnetic fields. During 1983–90 he dealt with problems related to the numerical solution of equations describing processes in the production of semiconductors and their operation. In the last period of his life Prof. Zlámal was engaged in the box method.

Prof. Zlámal always did his best to verify his theoretical results in the Finite Element Method numerically. This led gradually to the creation of programs for the solution of thin plates, for problems of plane elasticity with various kinds of elements mutually connected by interface elements, for heat transfer equations, magnetic fields, simulation of semiconductor production and basic semiconductor equations.

He always chose problems which were then topical not only from the theoretical but primarily from the practical point of view. In his papers he solved problems of basic significance and therefore his methods and proofs can be modified and extended to related fields, as we have seen for many a time. Thus careful reading of Zlámal's papers has often become an unexpected but extremely pleasant start of further creative work.

The list of his original scientific works will be published in Czechoslovak Math. J. 48(123) (1998), No. 1. Only when looking back at the sum of scientific, pedagogical and organizing activities of Professor Miloš Zlámal we realize how much he has left to us and how much we will miss him. In Miloš Zlámal, Czech scientific community has lost one of its most prominent mathematicians and Institute of Mathematics of the Faculty of Mechanical Engineering his outstanding member.