News and Notices

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IVO BABUŠKA AWARDED THE 1968 STATE PRIZE IN MATHEMATICS

Ing. Dr. IVO BABUŠKA, a leading research worker of the Institute of Mathematics of the Czecho-slovak Academy of Sciences, has been awarded a State Prize by the President of the Czechoslovak Socialist Republic. The award concerns Babuška's papers on stability and optimization in numerical mathematics by which he has made a significant contribution to the theory and the practice of numerical calculations.

The subject of the set of papers in question is closely connected with an intensive use of effective computers. It is a modern problem of high importance which could hardly have arisen before the advent of computers.

The finite character of numerical work, i.e. the performance of a finite number of operations with finitely many numbers having a finite number of decimal characters necessarily introduces errors in computations. These errors originate in rounding off, in substituting general analytic expressions by rational ones etc. In concrete cases, they may result in considerable difficulties. Some of them were known earlier but only a systematic use of computers has led to a deeper study of these phenomena, to the study of the numerical stability of algorithms and thus to the study of sensitivity of the given algorithm to the mentioned errors.

In the last 10 years the principal properties of the numerical stability of algorithms for the solution of algebraic problems have been studied with success by the English mathematician J. R. WILKINSON. In his papers Babuška turns his attention particularly to the study of numerical stability of the problems of mathematical analysis. The numerical solution of these problems is practically always concerned with the convergence of a sequence of approximate solutions to the solution sought. Babuška's procedure is quite different from that applied by Wilkinson. He characterizes the stability of an algorithm according to the behaviour of the difference between the theoretic approximate solution (i.e. that calculated with an infinite number of places) and the real one (influenced by errors) dependent on the convergence parameter.

This study has also shown that the frequent assumption of a random distribution of rounding-off errors and especially the assumption of an equal distribution with a zero mean value is highly disputable and that the random part of the piled up error is in fact a "value of minor order". A deep insight into the structure of algorithms obtained by the study of their stability enabled in the last time to modify some algorithms so as to improve their numerical stability. Strictly speaking, it is the problem of constructing new algorithms requiring, of course, a higher number of operations than those from which one starts. This brings us to the second field of interest of Dr. Babuška, i.e. to the problems of optimalization.

The optimization of algorithms is in general a natural task to find an algorithm in the given class (e.g. among algorithms with the same number of operations or among those achieving the same accuracy) which in a certain sense (to be defined exactly) would be optimum (e.g. the most accurate or the shortest as to the number of operations required). It is clear that only in this way the quality of algorithms can be judged seriously. On the other hand, even if the problem formulat-ed in such a way is solved with more or less difficulty, no much is gained in practice. We must in fact realize that in a computation we always handle an individuum, e.g. a unique concrete

function. And this function may very often be considered as an element of many spaces. These different spaces are mostly given by the degree of smoothness of the functions forming them. It is a great merit of Babuška to have introduced the concept of a universal algorithm in such a way that this algorithm need not be optimum in any of the spaces considered but is "almost" optimum for all spaces at once. This approach solves in a witty manner the problem of incorporating a concrete function in some of the spaces possible. I personally consider Babuška's achievements obtained in this field as most important. In my opinion they mean a promising prospect of further research which will bring very important and useful results.

The rang of scientific interests of Dr. Babuška is very wide. He has published about 80 papers on numerical mathematics, partial differential equations and elasticity theory. For his mathematical papers he often gets inspiration in technical problems. He has a strong sense of these problems and is particularly capable to grasp their mathematical essence. For him a mathematical problem of first importance consists in leading up the considered problem to the moment when, in concrete cases, a numerical solution may be obtained in a reliable and quick manner. And this is also the substance of his papers awarded the State Prize which provide a mathematical basis for practical work on computers. Babuška always has a lot of ideas and suggestions not only for the work of his own but also for that of his collaborators and for everybody who addresses himself to him. His active temperament is well known to everybody. We congratulate Dr. Babuška upon the high official appreciation of his activity and wish him every success for the great amount of work that lies before him.

Milan Práger, Praha

CENTENARY OF BIRTH OF PROFESSOR KAREL PETR

On June 7, 1968, the Association of Czechoslovak Mathematicians and Physicists along with the Board of Mathematics of the Czechoslovak Academy of Sciences and with the Faculty of Mathematics and Physics of the Charles University organized a celebration of the centenary of birth of KAREL PETR, Professor of the Charles University, member of the Czech Academy of Sciences and Arts and of the Czech Royal Society of Sciences, doctor honoris causa of the Charles University and of the University of J. E. Purkyně and honorary member of the Association of Czechoslovak Mathematicians and Physicists. The celebration took place in the main lecture-hall of the Faculty of Mathematics and Physics.

The presence at the meeting of the representatives of numerous mathematical institutions and of a number of young mathematicians testifies that the work of Karel Petr is greatly valued by Czechoslovak mathematicians.

The meeting was opened by Prof. J. NOVÁK. As an introduction to the appraisal of Prof. Petr's work Dr. L. NOVÝ gave a lecture under the title: "*The situation in Czech mathematics at the time when Karel Petr became professor at the Art Faculty of the Charles University*".

Different aspects of Prof. Petr's work were then dealt with in lectures delivered by Prof. ŠTEFAN SCHWARZ, Prof. VLADIMÍR KOŘÍNEK and Prof. JOSEF KOROUS. Prof. Schwarz lectured on the papers of Prof. Petr concerned with the theory of numbers, Prof. Kořínek on those concerned with algebra and Prof. Korous spoke about Prof. Petr's papers on mathematical analysis.

The lecture of Prof. VOJTĚCH JARNÍK was concerned with the text-books of Prof. Petr and Prof. VLADIMÍR KNICHAL devoted his lecture to his teaching activity.

These lectures not only threw a light on the personality of Prof. Petr and on his decisive significance for the whole further development of our mathematics but have also shown that number of his ideas and papers remain vivid and inspiring for the contemporary mathematical generation.

The Editorial Board of Časopis pro pěstování matematiky plans to publish these lectures or their extracts in further issues of the journal.

Editorial Board