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O. B. Lupanov (Eds.)

Fundamentals of Computation Theory

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PREFACE

This volume contains abridged versions of most of the sectional talks and some invited lectures given at the International Conference on Fundamentals of Computation Theory held at Kazan State University, Kazan, USSR, June 22-26, 1987. The conference was the sixth in the series of FCT-Conferences organized every odd year, and the first one to take place in the USSR. FCT'87 was organized by the Section of Discrete Mathematics of the Academy of Sciences in the USSR, Moscow State University (Department of Discrete Mathematics), and Kazan State University (Department of Theoretical Cybernetics). In preparing the conference program and the proceedings the organizers worked together with L. Budach and H. Antelmann, both of the Academy of Sciences in the German Democratic Republic.

Nowadays the importance of results from Discrete Mathematics and Mathematical Cybernetics has become obvious. The remarkable growth of interest in these fields has its substantial motivations. First of all the subject of Discrete Mathematics and Mathematical Cybernetics belongs to Mathematics as a deductive discipline, with its principles, problems and methods. But the peculiar role of Mathematical Cybernetics consists in the introduction of constructive mathematical methods into natural science, giving constructive interpretation to several natural phenomena closely related to investigations of reality, such as information, complexity, randomness, etc. This relates Mathematical Cybernetics to the natural sciences, gives an applied character to its results, but nevertheless keeps for it all the features of fundamental science. Finally, Mathematical Cybernetics has its origins in the increase of practical importance of computations on discrete and finite mathematical structures caused by the possibility of using modern computers for the solution of highly complex practical problems. This close connection of aims and methods, determined by such wealthy sources, generates a sophisticated synthesis of problems, methods and results, which we call Mathematical Cybernetics.

In this synthesis Discrete Mathematics represents itself as a permanently developing apparatus of mathematical tools forming a basis of research in Mathematical Cybernetics.

Such a variety of aims, problems, and methods as in Mathematical Cybernetics and Discrete Mathematics is a cause of permanent progress, relevance and importance of their results.

The papers in this volume have been selected from a total of 195. Altogether, this volume reflects the fact of FCT'87 being organized in the USSR. A wide range of problems typical of research in Mathematical Cybernetics in the USSR is represented quite completely. New questions such as computer-assisted deduction, problems of completeness of bases, and estimates of complexity of control systems supplement the range of problems FCT-Conferences traditionally deal with. There are many papers concerning problems of programming theory, in particular parallel computations, semantics of programming languages, equivalent transformations of programs, etc. Reflecting this range of problems the following sections were planned at the Conference:

- A. Mathematical Models of Computation
- B. Synthesis and Complexity of Control Systems
- C. Probabilistic Computations
- D. Theoretical Problems of Programming
- E. Problems of Computer-Assisted Deduction

The editors are most grateful to all who assisted in the preparation of this volume. In particular, they wish to thank the members of the International Program Committee, the representatives of the National Program and Organizing Committee of FCT'87 in the USSR, and the additional referees of FCT'87 (a list of these is presented below). The editors are responsible for the scientific level of the volume only. For the correctness of the results the authors are fully responsible.

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Professor Budach received 28 papers submitted to FCT'87
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