Colloquy on

"The Constructive Theory of Functions"

(Cluj, September 6th-12th, 1973)

The fifth colloquy with an international participation, organized by the Cluj Computation Institute, on a subject pertaining to the theory of approximation and its applications, took place in Cluj, between the 6th and the 12th of September, 1973. Present besides mathematicians were engineers, economists, doctors, biologists, chemists, physicists, musicologists, men of letters, men cultivating various arts, whose reports outlined the link between mathematical theory and practice as well as the fact that practice requires the use of the latest and most complex results of scientific research. This was emphasized in the opening speech delivered by Academician Tiberiu Popoviciu: "Under the conditions of the wide-scale use of electronic computers, mathematics has become an instrument of scientific investigation, a generator of a certain way of thinking for most various specialists. The way of mathematical treatment of a problem of economics, chemistry or linguistics should be finer, more refined and closer to the problem, namely it must more faithfully transpose in a mathematical presentation the phenomenon described in the problem. The mathematician must amplify his forces of scientific creation and adapt his point of view to the new situation. This is the reason why, under the present-day conditions, the very role of the theory of approximation is increasing, with all its ramifications in various chapters of mathematics. No prognosis studies can be made without the theory of approximation. No problems of operations research can be solved without using the theory of approximation."

The colloquy debates took place in plenums and in the following four sections:

1) The theory of approximation and numerical analysis.
2) Optimization problems with applications in economy.
3) Programming at computers and the arithmetic of intervals.
4) Applications of mathematics in various fields of scientific research. Problems of the modernization of mathematical education.

Round-table discussions also took place on the themes:

— Trends of development in the programming systems.
— Applications of mathematics in medicine, biology and pharmacology.
— Mathematics does not diminish the role of the beautiful in man's life.

Among the reports presented as part of the plenums, we mention the following: "The problem of rest in the approximation formulas of the analysis"; "The notion of convex function and the idea of aspect": "On some for-

mulas of curbature"; "Free and concatenated approximation"; "An algorithm for the best approximation L_p in a complex field"; "Recent results on octagonal polynomials on the whole real axis"; "A constructive point of view in the theory and calculus of series"; "An attempt at modernizing the educational process".

Reports on the solving of optimization problems in operations research and reports on programming at electronic computers were also presented, reports from among which we shall mention some.

The work "Optimization problems in topologically charted vectorial spaces" is trying to elaborate a theory of duality which should generalize the theory of duality in the linear programming in vectorial spaces of finite dimensions. Such problems occur in mathematical programming with several objective functions.

The report "On Lagrange's generalized function and on non-linerar duality for restrained optimization problems" considers the problem of optimization of a real functional defined on an arbitrary set by using a generalized Lagrange function. Also added to the problem presented are a few results of Goould, Evans, Howe and Everrett on Lagrange's multipliers and a theorem of duality is demonstrated.

An algebraic model of organization and management of data basis by setting out from the algebraic definition of the notion of generalized file and from the whiffletree shape of the structure of objects of the real field was expounded in the report "Data radix organization and management system". The work "Observations on the mathematical modelling of data structures" presented an algebraic model and a probabilistic model of direct and inverse interrogation as well as some practical criticisms which can be brought to purely mathematical theories of data generalized bases.

The colloquy debates were also attended by researchers of the Economic Cybernetics Department of the Bucharest Academy of Economic Studies with reports in the field of operations research.

Among other things, the work "On the efficiency of sequential optimizing algorithms" expounded the technique of sequential optimization for solving problems of non-linear programming and an estimation was made of the technical efficiency of sequential maximization on several classical test problems.

The report "On the simplex algorithm for non-linear programing" developed certain modifications which seem to increase its efficiency. For this, the centroid is calculated as a balanced mean with the variation of function on each of the simplex sides and a unidimensional optimization subroutine is used for establishing a new simplex.

Rosen's computing programme of the algorithm of the projected gradient was expounded in the report "On the efficiency of Rosen's algorithm". In the same report, on the basis of the results obtained on classical test problems, an estimation was made of the efficiency of the algorithm in comparison with other optimization methods. The work "The length-source relation in the PERT type problems with resources", a way of estimating resources taking into consideration the random aspect of length in resource optimization problems was presented.

The report "An application of Markov's chains and of simulation in the petro-chemical industry" presented the possibility of applying the theory of Markov's absorbing chains and of simulation for establishing the quantity of raw materials and semi-fabs necessary for carrying out a known production plan.

The colloquy on "The constructive theory of functions" enjoyed a large participation and represented a fruitful exchange of opinions between mathematicians, on the one hand and between mathematicians and non-mathematicians, on the other hand.

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