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Edited by Jacques Calmet



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PREFACE

EUROCAM '82 is the first major conference to be organized by the European computer algebra community. The symposia in the field previously held in Europe (Stockholm, 1974 and Marseilles, 1979) had for main sponsor and organizer the SIGSAM group of the ACM. In January of 1981 it was decided that the time for a purely European conference had come. Indeed the number of researchers active in the field of computer algebra and the quality of their work had steadily increased over the recent years in our part of the world.

This meeting has been held in Marseilles which has a long experience in organizing similar colloquia. In fact EUROCAM '82 can as well be considered as being the sixth in the "International Colloquium on Advanced Computing Methods" series initialized in 1970 with A. Visconti. It was hosted by the newly operating "Centre International de Rencontres Mathématiques" in the Luminy campus of the University of Aix-Marseille II which turned out to be a very pleasant meeting place.

Invited, selected (referred), informal talks and demonstrations of systems were presented during the conference. Only the invited and selected ones appear in these proceedings. The selection of papers has been the responsibility of the program committee with the help of outside referees when appropriate. When the decision to held EUROCAM '82 was taken it was assumed that both the number of papers submitted for selection and the number of attendees would be large enough to insure its success. This has indeed be true and one can predict that this is only the first one in a series of European conferences on Computer Algebra.

As the main organizer of EUROCAM '82 I want to express my gratitude to Marc Bergman who was in charge of the local arrangements. This was not an easy job because the number of attendees was almost twice as large as expected. The program committee members spent much time and efforts in setting up the final program. Special thanks are deserved to the sessions chairmen who have been successful in keeping a strict schedule for the 55 communications presented during the three days of the conference. They are: G.E. Collins, I. Frick, J.P. Fitch, M. Mignotte, R. Loos, J. Davenport, A.C. Norman, J. Smit, P.S. Wang, J. van Hulzen, A.C. Hearn, J. Aman, D.R. Musser and M. Bergman.

ACM and its specialized group SIGSAM have given to EUROCAM '82 their official approval for cooperation. This was showing their confidence in the scientific quality of this first European conference. Besides this motivation when applying for it I was driven by a very personal will of keeping closed links with this world-wide professional organization. I am grateful to the SIGSAM chairman, Tony Hearn, for helping me with this application.

Jacques Calmet
IMAG, Grenoble

REMERCIEMENTS

Organiser une conférence internationale requiert certainement de nombreux efforts de la part de nombreuses personnes. Toutefois ces efforts seraient vains si de généreuses institutions ne mettaient pas à la disposition des organisateurs les moyens financiers nécessaires.

EUROCAM '82 a eu la chance d'être jugé digne d'intérêt scientifique par la DRET (Direction des Recherches, Etudes et Techniques du Ministère de la Défense), l'Université d'Aix-Marseille II, la SMF (Société Mathématique de France) et le CNRS (Centre National de la Recherche Scientifique) par l'intermédiaire de la RCP (Recherche Cooperative sur Programme) gérée par la SMF.

Nous remercions ces organismes pour leurs aides financières importantes qui ont grandement contribué au succès de cette conférence.

M. Bergman et J. Calmet

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INTRODUCTION

This is the second Computer Algebra Conference proceedings published by Springer-Verlag in its Lecture Notes in Computer Science series. The first ones appeared in LNCS 72 in 1979.

For many years this discipline was in search of its identity. This is illustrated well enough by the different names used to identify it. Almost any combination of the words: algebraic, symbolic, computation, manipulation, applied mathematics has indeed be a name for it. Computer Algebra may not be the best one but it indicates rather well that algebraic algorithms are the core of the field. It shows also the important role played by Mathematics in this domain of Computer Science. One of the main achievements of the discipline in the recent years has probably been to succeed in convincing mathematicians that it can provide them with many non-trivial mathematical problems well suited for their skill and training. They range from proving an existence (or non-existence) solution to an equivalence problem in the canonical approach to simplification to finding constructive methods to solve various problems (root finding, factorization, integration,...) on different algebraic structures. We hope that the large variety of topics covered in these proceedings is a good illustration of this statement.

The design, analysis and implementation of constructive algebraic algorithms is probably the ultimate goal of computer algebraists. As a consequence the heuristic approach sometimes used to solve problems some years ago is becoming less and less important nowadays. At that time opinions were expressed that computer algebra has closed links with artificial intelligence. This is therefore no longer true at present.

A constant feature of the discipline is the importance given to applications. This can be checked in any conference proceedings where several sections are always devoted to them. This is probably due to the fact that results first reported as applications have sometimes be included in computer algebra systems. In fact some of the papers listed as applications in these proceedings ought to be part of the algorithm sections. It was mainly for a convenient planning of the sessions that they are not.

It was the will of the program committee to have invited talks on data type analysis and rewrite rules as well as on algebraic specifications in software development. Although some of these topics may presently be considered as lying on the border line of our field we think that we have many useful informations to learn from them on how to design the next generation of computer algebra systems.

These proceedings reflect most of the lines of research in our domain including one which is only mentionned in the talk on algebra system development: the availability of personal algebra machines in the near future. This will have a big impact on the use

of such systems and has been expected by practitioners of the field for many years.

The ordering of the sections in this volume only reflects the late arrival of some of the contributions, not the actual one at the conference.

It is our hope that these proceedings will help the scientific community to be better acquainted with the research going on in our domain. For those also interested in more basic materials we may suggest to read the 1982 Computing Supplementum (Springer-Verlag Ed.) which intends to fill a previously existing gap.

Jacques Calmet