Foreword

The International Symposium on Symbolic and Algebraic Computation is the premier conference spanning all areas of research in symbolic mathematical computation. The series has a long history, established in 1966 and operating under the ISSAC name since 1988. This year's meeting is the 35th occurrence and is held at the Technische Universität München.

With a subject that has been so thoroughly studied for half a century some might ask whether the main questions have been answered and whether any important challenges remain. Nothing could be farther from the present exciting state of affairs! A quick glance through these proceedings will reveal a subject that is more vibrant than ever. In some ways we are today experiencing a golden age in symbolic computing: On one hand, we are studying a wider range of mathematical problems and we have deeper algorithmic insight into the central problems than ever before. On the other hand, the scale and nature of computing hardware that is widely available make asymptotically fast and parallel algorithms of immediate practical interest. Not only are these computational problems very interesting in their own right, their solution has a significant practical impact, affecting the millions of users of free and commercial computer algebra packages. Surely there has never been a more interesting time in symbolic mathematical computation.

ISSAC 2010 brings together a good number of the world's most active researchers in the area for a period of four days. As has become our tradition, the meeting features invited presentations, tutorials, contributed research papers, software presentations and a poster session for works in progress. In this way, the participants are able to keep up with a broad range of areas and to present work at different stages of maturity.

The invited presentations touch both on central topics in computer algebra and highly relevant nearby areas:

Evelyne Hubert: *Algebraic Invariants and their Differential Algebras*
Siegfried M. Rump: *Verification Methods: Rigorous Rresults using Floating-Point Arithmetic*
Ashish Tiwari: *Theory of Reals for Verification and Synthesis of Hybrid Dynamical Systems*

We are grateful that these distinguished speakers have agreed to speak at our meeting.

The ISSAC tutorials have always been popular. They are intended to make new areas accessible to practitioners in other areas of the field. This year we are fortunate to have tutorials by three truly talented expositors:

Moulay A. Barkatou: *Symbolic Methods for Solving Systems of Linear Ordinary Differential Equations*
Jürgen Gerhard: *Asymptotically Fast Algorithms for Modern Computer Algebra*
Sergey P. Tsarev: *Transformation and Factorization of Partial Differential Systems with Applications to Stochastic Systems*

At ISSAC 2010, in a departure from the usual practice, the tutorials carry no registration fee. We are eager to see what effect this has.

As usual, the main body of the conference consisted of contributed research papers. A call for papers was circulated one year prior to the meeting, inviting contributions in all areas of computer algebra and symbolic mathematical computation. These included:

Algorithmic aspects: exact and symbolic linear, polynomial and differential algebra; symbolic-numeric, homotopy, perturbation and series methods; computational geometry, group theory and number theory; summation, recurrence equations, integration, solution of ODE & PDE; symbolic methods in other areas of pure and applied mathematics; theoretical and practical aspects, including general algorithms, techniques for important special cases, complexity analyses of algebraic algorithms and algebraic complexity;

Software aspects: design of packages and systems; data representation; software analysis; considerations for modern hardware, *e.g.,* current memory and storage technologies, high performance systems and mobile devices; user interface issues, including collaborative computing and new methods for input and manipulation; interfaces and use with systems for, *e.g.,* document processing, digital libraries, courseware, simulation and optimization, automated theorem proving, computer aided design and automatic differentiation;

Application aspects: applications that stretch the current limits of computer algebra algorithms or systems, use computer algebra in new areas or new ways or apply it in situations with broad impact.

In response, 110 submissions were received and considered. These were reviewed by members of the Program Committee and a wide range of external reviewers. In all, 349 reviews were obtained and every paper received between 3 and 5 reviews. PC members could neither participate in nor see the discussions relating to papers with which they had conflicts of interest. Following the PC deliberations, 45 contributed research papers were accepted for presentation at the conference and inclusion in these proceedings.

These proceedings present the contributed research papers in the order of presentation. They are grouped loosely by topic in a manner that fits the conference schedule. Other presentation groupings might provide somewhat more scientific coherence, but could not be accommodated for practical reasons.

Wolfram Koepf   **Stephen M. Watt**   **Ernst W. Mayr**
General Chair   *Program Committee Chair*   *Local Arrangements Chair*

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