Foreword from the Editors

This issue of the Journal of Symbolic Computation collects selected papers on work presented at, or related to, the meeting MEGA 2005, held in Porto Conte, Alghero, Sardinia (Italy), May 27 - June 1, 2005.

MEGA is the acronym for "Effective Methods in Algebraic Geometry" (and its equivalent in Italian, French, Spanish, German, Russian, etc.), a series of (roughly) biennial conferences on computing in and with Algebraic Geometry: Theory, Algorithms, Implementations, Applications. Previous meetings were held in 1990 (Castiglioncello, Italy), 1992 (Nice, France), 1994 (Santander, Spain), 1996 (Eindhoven, Nederlands), 1998 (St. Malo, France), 2000 (Bath, United Kingdom) and 2003 (Kaiserslautern, Germany).

On this occasion, MEGA was also an opportunity to celebrate the 60th birthday of Prof. Carlo Traverso (Università di Pisa), one of the founders of MEGA and the chairman of the 2005 Conference. A special session within this MEGA, with several talks by colleagues and friends on his work and achievements, was devoted to honor him. Next MEGA 2007 will take place on June 24-30, 2007, at Strobl am Wolfgangsee, Austria.

MEGA is run by a Steering Committee with the help of a larger Advisory Board, which takes care of refereeing the submitted contributions, only for oral presentation at the Conference. Even at this stage the refereeing process is quite strict, to keep the high standards of MEGA, so that the Conference can be regarded as the *premiere* in its field, presenting recent and on-going major breakthroughs on its different topics of interest. Following the traditions of MEGA, at and after the Conference, a new call for papers is announced, inviting all the participants of MEGA to submit papers for a special issue in a prestigious journal. This invitation is also extended to any researcher interested in the topics of the MEGA. These papers are subject to a new refereeing procedure, under the independent responsibility of some appointed members of the Steering Committee.

In this opportunity, this task was assigned to Prof. Alicia Dickenstein (Universidad de Buenos Aires), Prof. Patrizia Gianni (Università di Pisa) and Prof. Tomas Recio (Universidad de Cantabria). We decided immediately to attempt publishing for the second time the –so called– Proceedings of MEGA through the Journal of Symbolic Computation, because of its prestige and impact in our community. We would like to thank the Editor in Chief of the Journal of Symbolic Computation, Prof. Hoon Hong, who accepted without hesitation our proposal, for all his help along the editorial process. As guest editors of the Special Issue, we circulated a call for papers in July 2005, with November 2005 as deadline. We received 41 submissions, covering many different topics. After a detailed refereeing process, including in most cases three or four different reviews, thirteen papers have been finally selected.

We must remark that many other contributions, with excellent reports, could not be accepted for this Special JSC-MEGA issue, because of the page limitations. Deciding the excellence among the best has been, perhaps, the most difficult task of the guest editors. On the other hand we are much indebted to the authors and the referees for their very professional cooperation and understanding of the hardships of our job.

Concerning the contents of this issue, we are proud to remark that the selected papers cover a broad range of topics, including

- the study of condition numbers for singular systems, generalizing results by Shub and Smale for regular homogeneous systems, as in the paper by Beltran and Pardo.

- multivariate polynomial optimization problems, via the translation to large but sparse linear eigenvalue problems solved by iterative techniques, as in the paper by Bleylevens, Peeters and Hanzon.
- the design of algorithms for the computation of the tropicalization of algebraic affine varieties, as in the paper by Bogart, Jensen, Sturmfels and Thomas.
- the computational and combinatorial study of simplicial trees, a natural combinatorial representation of certain square free monomial ideals, as in the paper by Caboara, Faridi and Selinger.
- a description of the invariants of plane curve singularities and their deformations and an algorithm to compute the equisingularity stratum, as in the paper by Campillo, Greuel and Lossen.
- the study of the sparse discriminant of toric varieties, its behavior under specialization and applications to the classification of dual defect toric varieties as in the paper by Curran and Cattani.
- the characterization of the geometric structure of the double point locus for several special types of bicubic surfaces, as in the paper by Galligo and Stillman.
- the description of a new deterministic algorithm for factoring polynomials over finite fields, which uses linear algebra in modules over operator algebras and improves the algorithms of Berlekamp and Niederreiter, as in the paper by Genovese.
- the study of local invariants of singularities, developing the theory of standard bases for certain modules over complete local subdomains of power series, as in the paper by Hefez and Hernandes.
- a detailed study of the compactification of the family of non-degenerate nodal plane cubics in $\mathbb{P}^3$, obtaining a verification of their characteristic numbers originally found by Schubert, as in the paper by Hernandez, Miret and Xambó-Descamps.
- the computation of rational invariants for rational actions of linear algebraic groups on affine space, as in the paper by Hubert and Kogan.
- complexity results for the computation of multi-homogeneous resultants using the straight-line program representation for polynomials, as in the paper by Jeronimo and Sabia.
- the computation of differential Galois groups via numeric-symbolic algorithms, as in the paper by van der Hoeven.

We believe that, in all cases, the selected papers are definitely important ones for the corresponding area of interest and that they will be quoted and consulted often in the years to come. Anyway, the guest editors would like to thank all the authors who have submitted their precious manuscripts to this issue and to ask for their understanding for our possible mistakes. Thanks also go to the many anonymous referees, who have worked so devotedly under our severe constraints. This volume bears the name of the authors, but hidden referees would merit, in many cases, to be credited as well for so many freely given suggestions, generous improvements and detailed corrections. We are entirely responsible of all remaining errors.

Dear reader, we hope you enjoy this issue.

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