

# **The Joint Conference of ASCM 2009 and MACIS 2009**

Asian Symposium on Computer Mathematics

Mathematical Aspects of Computer and Information Sciences

Editors: Masakazu Suzuki, Hoon Hong, Hirokazu Anai,  
Chee Yap, Yousuke Sato, Hiroshi Yoshida

## About MI Lecture Note Series

The Math-for-Industry (MI) Lecture Note Series is a successor to the COE Lecture Notes, published for the 21st COE Program “Development of Dynamic Mathematics with High Functionality”, sponsored by Ministry of Education, Culture, Sports, Science and technology-Japan (MEXT) (From 2003 to 2007).

The MI series reports lectures given by scholars invited under the following two programs: “Training Program of Ph.D. and new Master’s in Mathematics as Required by Industry”, adopted as a Support Program for Improving Graduate School Education by MEXT (from 2007 to 2009); and “Education-and-Research Hub for Mathematics-for-Industry”, newly adopted as a Global COE Program by MEXT (from 2008 to 2012).

July 2008

Masato Wakayama

Global COE Program “Education-and-Research Hub for Mathematics-for-Industry”  
Program Leader

## **The Joint Conference of ASCM 2009 and MACIS 2009**

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## Foreword

Two international conferences, the 9th Asian Symposium on Computer Mathematics (ASCM 2009), and the 3rd International Conference on Mathematical Aspects of Computer and Information Sciences (MACIS 2009), are held jointly at Fukuoka on December 14th-17th 2009 supported by the GCOE program "Math-for-industry" of the Graduate School of Mathematics of Kyushu University and Mathematical Research Center for Industrial Technology (MRIT) of Kyushu University. The programs of ASCM and those of MACIS are organized independently by each program committee except for invited talks. Sessions of ASCM and those of MACIS are held in parallel and the invited talks are given in plenary sessions. There is also a satellite event associated with the conference. The Workshop on E-Inclusion in Mathematics and Science 2009 (WEIMS'09) is held at JST Innovation Plaza Fukuoka, just prior to ASCM-MACIS 2009.

**The Asian Symposium on Computer Mathematics (ASCM)** is a series of conferences which serve as a forum for participants to present original research, learn of research progress and developments, and exchange ideas and views on doing mathematics using computers. The previous ASCM meetings were held in Beijing, China (1995), Kobe, Japan (1996), Lanzhou, China (1998), Chiang Mai, Thailand (2000), Matsuyama, Japan (2001), Beijing, China (2003), Seoul, Korea (2005), Singapore, Singapore (2007). This year, the meeting consists of invited talks, regular sessions of contributed papers, and three organized sessions on the following topics:

- 1) Digitizing Mathematics – From Pen and Paper to Digital Content –
- 2) Validated Numerical Computation
- 3) Computational Algebraic Number Theory

Each organized session is run by its organizer(s) independently. Regular sessions are run in a traditional style of ASCM. Specific topics include but are not limited to:

- \* Computer-aided problem solving and instruction
- \* Symbolic, algebraic, and geometric computation
- \* Computational number theory, cryptography, and combinatorics
- \* Automated mathematical reasoning and interactive theorem proving
- \* Symbolic/numeric hybrid methods
- \* Computational algebra and geometry
- \* Formalization of mathematics
- \* Computational methods for differential and difference equations
- \* Mathematical software design and implementation
- \* Parallel/distributed/network computing
- \* Exact numerical methods and zero bounds
- \* Foundations of real computation and complexity issues

**Mathematical Aspects of Computer and Information Sciences (MACIS)** is a new series of conferences where foundational research on theoretical and practical problems of mathematics for computing and information processing may be presented and discussed. MACIS also addresses experimental and case studies, scientific and engineering computation, design and implementation of algorithms and software systems, and applications of mathematical methods and tools to outstanding and emerging problems in applied computer and information sciences. The first MACIS conference took place in Beijing (China), July 24-26, 2006. The second MACIS conference took place in Paris (France), December 5-7, 2007.

MACIS2009 is run in a format where each PC member organizes a session on a specific topic. MACIS 2009 consists of 3 sessions on three main themes as shown in the following:

- 1) Polynomial system solving (Complex/Real/Rational)
- 2) Systems and Control
- 3) Software Science

There were 39 papers submitted to ASCM regular sessions this year. The program committee selected the 26 papers appearing in these proceedings after careful evaluation including two or more referee reports per submission. Almost all the papers for the organized sessions of ASCM and MACIS were solicited by the organizers. The numbers of selected papers for organized session are as follows:

ASCM:

- |  |   |
|--|---|
| 1) Digitizing Mathematics                | 6 |
| 2) Validated Numerical Computation       | 6 |
| 3) Computational Algebraic Number Theory | 3 |

MACIS:

- |  |                          |
|--|--------------------------|
| 1) Polynomial system solving (Complex/Real/Rational) | 8                        |
| 2) Systems and Control                               | 5                        |
| 3) Software Science                                  | 6+1 (Short presentation) |

We gratefully acknowledge the thorough and important work of the program committee members and referees, whose names appear on the following pages, and thank all the authors and lecturers for their contributions.

We are grateful for the support of the sponsoring organizations noted at the web page of ASCM-MACIS 2009. As for their organizational assistance we particular thank the local organizers and the COE office at Kyushu University.

December 2009

Masakazu Suzuki  
Hoon Hong  
Hirokazu Anai  
Chee Yap  
Yosuke Sato  
Hiroshi Yoshida  
Tatsuyoshi Hamada  
Koji Nakagawa  
Kazuhiro Yokoyama

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Kiyoshi Shirayanagi	Akira Suzuki
Gilles Villard	Dingkang Wang
Chun-Ming Yuan	Lihong Zhi

### Invited Speakers

Markus Rosenkranz	Johann Radon Institute for Computational and Applied Mathematics, Austria (Joint work with Professor Bruno Buchberger)
Toshinori Oaku	Tokyo Woman's Christian University, Japan
Kokichi Sugihara	Meiji University, Japan
Lihong Zhi	Academy of Mathematics and System Sciences, China

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