Monte Carlo Methods and Applications

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Selection of papers presented at the IV IMACS Seminar on Monte Carlo Methods, Berlin, September, 15–19, 2003.

Foreword

Welcome to this issue of *Monte Carlo Methods and Applications* with the selected papers from the Fourth IMACS Seminar on Monte Carlo Methods hosted by the Weierstrass Institute for Applied Analysis and Stochastics (Berlin), under the support of the Konrad-Zuse-Zentrum for Scientific Computing (ZIB, Berlin), Humboldt University (HU, Berlin), and co-sponsored by the Deutsche Forschungsgemeinschaft (DFG). Over time, the IMACS Seminar on Monte Carlo Methods has created a history, which goes back to April 1997 when the first MC Seminar was organized by R. Beauwens, A. Dubus, and M. Hou in Brussels. At this IMACS MC Seminar, 3 invited plenary lectures were given (M. H. Kalos, K. K. Sabelfeld, and I. M. Sobol). The overview of the first four IMACS seminars and the forthcoming 5th IMACS MC Seminar which will be organized by M. Mascagni (Tallahassee, USA) in 2005 are given in the following table:

# IMACS Seminar	Date	Place	Organizers
I IMACS Seminar	April 1-3, 1997	Brussels, Belgium	R. Beauwens, A. Dubus, M. Hou
II IMACS Seminar	June 7-11, 1999	Varna, Bulgaria	I. Dimov
III IMACS Seminar	September 10-14, 2001	Salzburg, Austria	K. Entacher, W. Schmid, A. Uhl
IV IMACS Seminar	September 15-19, 2003	Berlin, Germany	K. Sabelfeld
V IMACS Seminar	May 16-20, 2005	Tallahassee, USA	M. Mascagni

Selected papers presented at these seminars have been published as follows: the first seminar, in *Mathematics and Computers in Simulation*, Vol. 47 (1998), 2-5; the second seminar, in *Mathematics and Computers in Simulation*, Vol. 55 (2001), 1-2; the third seminar, in *Mathematics and Computers in Simulation*, Vol. 62, 3-6; the fourth seminar, in *Monte Carlo Methods and Applications*, Vol.10 (2004), 3-4 (this issue).

The Fourth IMACS MC Seminar in Berlin was the first in this series to have presentations from a broad slice of the Monte Carlo community from all around the World. This Seminar had more than 170 participants, from over 35 countries, presenting contributed talks and contributing to 16 special sessions. The plenary lectures were given by J. Halton, N. Bouleau, D. Talay, and K. Ritter.

Information about this Fourth IMACS Seminar can be found at the URL
[http : //www.wias – berlin.de/main/events/workshops/xMCM2003](http://www.wias-berlin.de/main/events/workshops/xMCM2003)
including the Book of Abstracts on the following pages at
[http : //www.wias – berlin.de/people/sabelfel/public_html/abstracts – imacs/index.html](http://www.wias-berlin.de/people/sabelfel/public_html/abstracts-imacs/index.html)

The research topics presented in this issue include both fundamental contributions to the Monte Carlo theory, and applications in a broad variety of branches of science and technology. The breadth of coverage can be seen in the titles of the Special Sessions of the Berlin Seminar:

1. Monte Carlo Simulation of Semiconductor Structures and Devices
2. Hybrid-Monte Carlo Methods
3. High Dimensional Integration
4. Random Walk Methods and Applications in Porous Media
5. Random Walk Methods for High Dimensional PDEs and Some Applications
6. Stochastic interacting particle systems
7. Stochastic Methods for the Simulation of Complex Biological Structures: Ion Channels
8. Stochastic Methods in Data Analysis and Random Numbers
9. Stochastic Simulation Methods for Small-scale Systems
10. Quasi-Monte Carlo Methods and Markov Chains
11. Monte Carlo and Quasi- Monte Carlo Methods in Computer Graphics
12. Parallel Monte Carlo Methods and the GRID
13. Approximation methods for stochastic differential equations
14. Finance Models and Simulations
15. Monte Carlo Approach to Contaminant Transport
16. Applications of Monte Carlo Simulation in System Dependability Analysis

It should also be mentioned that this Monte Carlo forum brought together Monte Carlo communities from both the West and the East. This created a unique opportunity to establish new interesting contacts between rather different groups and scientists that might have never had the opportunity to meet before. I do believe that this tradition will be followed also by the organizers of the next IMACS Seminar.

Acknowledgements

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I also thank the reviewers for their very hard work in making this issue possible. We all greatly appreciated the high quality of papers that we received from such a variety of contributors.

Karl Sabelfeld,
The Chair to the Fourth IMACS Seminar,
and The Editor to MCMA Journal