Special Session
on

MONTE CARLO and QUASI-MONTE CARLO METHODS AND APPLICATIONS

Abstract

This special session will be focused but not limited on traditional topics:

- Theory of Monte Carlo and quasi-Monte Carlo methods for evaluating of multidimensional integrals in functional spaces and integral equations;
- Monte Carlo solution of partial differential equation, a priori estimates and error analysis;
- Monte Carlo and quasi-Monte Carlo methods for linear algebra problems;
- Theory of the uniform distribution of sequences; numerical measures for uniform distribution of sequences and nets;
- Randomized quasi-Monte Carlo methods;
- Improvement and optimization of Monte Carlo algorithms; statistical enhancement;
- Parallel implementations of Monte Carlo algorithms for computationally intensive problems.

Advanced computational challenges posed by the modern applications in engineering, electronics, finances and image creation will be presented.

Especially, numerical and computational challenges in modern micro- and nanoelectronics are encouraged. We are going to discuss the following application topics:

- Monte Carlo methods for classical and quantum transport simulations;
- Applications of Monte Carlo methods to modern semiconductor materials, devices and nanostructures;
- Limitations and practicality of Monte Carlo approach in conjunction with other numerical methods for device simulations.

Image creation applications are focusing on the following challenges:

- Developing efficient Monte Carlo and quasi-Monte Carlo solvers for Fredholm type integral equation that is a basis for photorealistic image creation as well as other graphics simulations and applications;
- Application of efficient sampling schemes using random numbers, low discrepancy sequences and nets for reducing the solution error; development of computational schemes suitable for parallel architecture of the Graphical Processor Units (GPU);
- Implementation of Monte Carlo solvers for integration problems and energy transport equations on GPU; Real-time computer graphics simulations and applications.