NUMTA 2023 Special Session on

High-Performance Computing in Modelling and Simulation

Special Session Organizers:

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Submission notes: The authors are invited to contact the organizers of the special session (William Spataro: spataro(at)unical.it) before submitting their abstract (please include "HPCMS – NUMTA 2023 abstract submission" in the subject).

Abstract: Model development for the simulation of the evolution of artificial and natural systems is essential for the advancement of Science. The increasing power of computers has allowed to considerably extend the application of computing methodologies in research and industry, but also to the quantitative study of complex phenomena. This has permitted a broad application of numerical methods for differential equation systems (e.g., FEM, FDM, etc.) on one hand, and the application of alternative computational paradigms, such as Cellular Automata, Genetic Algorithms, Neural networks, Swarm Intelligence, etc., on the other. These latter have demonstrated their effectiveness for modelling purposes when traditional simulation methodologies have proven to be impracticable.

An important mission of the HPCMS Special Session within the NUMTA 2023 International Conference and Summer School is to provide a platform for a multidisciplinary community composed of scholars, researchers, developers, educators, practitioners and experts from world leading Universities, Institutions, Agencies and Companies in Computational Science, and thus in the High-Performance Computing for Modelling and Simulation field.

The session intent is to offer an opportunity to express and confront views on trends, challenges, and state-of-the art in diverse application fields, such as engineering, physics, chemistry, biology, geology, hydrology, medicine, ecology, traffic control, economy, etc.

Topics of interest include, but are not limited to, the following:

- High-performance computing in computational science: intra-disciplinary and multi-disciplinary research applications
- Complex systems modelling and simulation
- Cellular Automata, Genetic Algorithms, Neural networks, Swarm Intelligence implementations
- Integrated approach to optimization and simulation
- MPI, OpenMP, GPGPU applications in Computational Science
- Optimization algorithms, modelling techniques related to optimization in Computational Science
- High-performance Software developed to solve science (e.g., biological, physical, earth science and social), engineering, medicine, and humanities problems
- Hardware approaches of high-performance computing in modeling and simulation