

RECENT ADVANCES IN THE DEVELOPMENT AND APPLICATION OF TIME DISCRETIZATION METHODS.

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ABSTRACT

Time integration plays a fundamental role in the numerical simulation of complex multiscale and multiphysics systems, where disparate temporal scales and tightly coupled physical processes challenge existing algorithms. This minisymposium brings together researchers to discuss the design, analysis, and application of modern time discretization techniques. Presentations will span theoretical analysis, algorithmic development, and practical implementations, exploring topics that include high-order Runge–Kutta methods, geometric and structure-preserving integrators, adaptive and multirate time-stepping, exponential and IMEX methods, and time integration for coupled multiscale and multiphysics problems. By highlighting both methodological innovations and application-driven developments, the session seeks to promote interdisciplinary collaboration and advance the state of the art in time integration.

SPEAKERS

1. Zachary Grant (University of Massachusetts Dartmouth): Accelerating Runge–Kutta Methods via Perturbation.
2. Sigal Gottlieb (University of Massachusetts Dartmouth): Mixed model Runge–Kutta simulations.
3. Tommaso Buvoli (Tulane University): Linearly-Implicit Nonlinearly Partitioned Runge-Kutta Methods

4. Brian Tran (California State University Long Beach): Applications of nonlinearly partitioned time integration methods.
5. Giovanni Russo (University of Catania): Asymptotic-Preserving Exponential Integrators applied to the Hyperbolic Korteweg-de Vries System..
6. Mayya Tokman (University of California Merced): New Approaches in Construction and Application of Exponential Integrators.
7. Benjamin Seibold (Temple University): The Importance of Order Reduction Mitigation in Adaptive Time Stepping