

HIGH-ORDER POLYTOPAL METHODS FOR PDES AND RELATED APPLICATIONS: A NEMESIS MINI-SYMPOSIUM

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ABSTRACT

High-order polytopal methods have emerged as a powerful framework for the numerical approximation of partial differential equations (PDEs), combining high-order accuracy with the flexibility of general polygonal and polyhedral meshes. This mini-symposium, organized in the framework of the ERC SyG NEMESIS project, brings together researchers working on the analysis, development, and application of advanced, high-order, polytopal discretization techniques, including Virtual Elements, Hybrid High-Order, (hybridized) polytopal discontinuous Galerkin, Discrete De Rham methods, and related approaches. Contributions will address theoretical advances, efficient algorithms, adaptivity, machine-learning enhancement, and applications to challenging problems in science and engineering. The session aims to foster exchanges between experts in numerical analysis, scientific computing, and applied mathematics, highlighting recent developments and future directions in high-order polytopal methods.

SPEAKERS

1. Silvia Bertoluzza (CNR): Polytopal HDG simulation of Cancer-on-chip devices
2. Andrea Borio (Politecnico di Torino): Theoretical and applicative aspects of Stabilization-Free Polytopal Methods
3. Michele Botti (Politecnico di Milano): A novel penalization strategy for high-order PolyDG discretizations of nonlinear elliptic problems
4. Lorenzo Botti (Università degli Studi di Bergamo): HHO methods for multi-component incompressible flows
5. Esteban Coiffier (Université de Montpellier): The Discrete de Rham Method for time-harmonic Maxwell equations
6. Franco Dassi (Università degli Studi di Milano Bicocca): Basic Principles Of Axisymmetric Virtual Element Method For General Order Elliptic Problems
7. Ivan Fumagalli (Politecnico di Milano): A high-order polytopal discontinuous Galerkin discretization of fluid-poroelastic structure interaction in brain tissue biomechanics
8. Sergio Gomez (Università degli Studi di Milano Bicocca): A discontinuous Galerkin method with fractal elements
9. Aghili Joubine (University of Strasbourg): Hybrid High-Order Discretizations for Gauge-Invariant Problems
10. Emil Hossjer (Université de Montpellier): Multigrids for Hybrid High-Order methods
11. Hodayfa Labbi (Université de Montpellier): Quasi-norm methods for the analysis of non-linear HHO schemes
12. Roland Masson (University Côte d'Azur): TBA
13. Ilario Mazzieri (Politecnico di Milano): High-order space-time discretizations for multiphysics wave propagation on polytopal grids
14. Vincent Perrier (INRIA): TBA
15. Jia Jia Qian (Oxford University): A symmetry preserving discretisation of Liouville field theory
16. Marwa Salah (INRIA): Hybrid Polyhedral Methods for Eddy Current Testing

17. Giuseppe Vacca (Università degli Studi Bari): Divergence-free and mass-conservative virtual element methods for the Navier–Stokes–Cahn–Hilliard system