

POLYTOPAL METHODS IN MECHANICS: BRIDGING MATHEMATICS AND ENGINEERING

100 - ADVANCED DISCRETIZATION TECHNIQUES

P. ANTONIETTI^{*}, E. ARTIOLI[†],
L. BEIRAO DA VEIGA[#], D. A. DI PIETRO[¶] AND P. WRIGGERS[‡]

^{*} Laboratory for Modeling and Scientific Computing (MOX), Dipartimento di Matematica,
Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milano, IT
paola.antonietti@polimi.it, <http://antonietti.faculty.polimi.it>

[†] Department of Engineering “Enzo Ferrari”, University of Modena and Reggio Emilia
Via P. Vivarelli 10, Modena, IT
edoardo.artioli@unimore.it, <https://personale.unimore.it/rubrica/dettaglio/eartioli>

[#] Università di Milano-Bicocca
Department of Mathematics and Applications, Via Cozzi 55, Milano, IT
lourenco.beirao@unimib.it, <https://sites.google.com/unimib.it/lbeiraodaveiga>

[¶] Université de Montpellier
Institut Montpellierain Alexander Grothendieck, place Eugène Bataillon, 34090 Montpellier, France
daniele.di-pietro@umontpellier.fr, <https://www.imag.umontpellier.fr/~di-pietro/>

[‡] Institut fuer Kontinuumsmechanik, Leibniz Universitaet Hannover
An der Universitaet 1, Gebäude 8142, 30823 Garbsen
wriggers@ikm.uni-hannover.de, <http://www.ikm.uni-hannover.de>

Keywords: Polytopal Methods, Numerical Methods in Mechanics.

ABSTRACT

Polytopal methods—numerical methods capable of handling general polygonal and polyhedral meshes—have experienced significant growth over the past decade in both the mathematics and engineering communities. Notable examples include Virtual Elements, Hybrid High-Order methods, PolyFEM, Polytopal Discontinuous Galerkin methods, and Mimetic Discretizations.

These methods are particularly well-suited for addressing engineering problems in fluid and solid mechanics, owing to their remarkable flexibility in representing complex geometries, interfaces, and heterogeneous media. They also offer enhanced capabilities for mesh adaptivity due to the capability of managing efficiently hanging nodes, and elements with highly general shapes. Furthermore, polytopal methods have inspired ideas to design elements that are novel also on classical meshes, both in fluid and solid mechanics.

This minisymposium aims to bring together mathematicians and engineers to discuss recent advances in polytopal methods with a particular focus on applications in mechanics.