TITLE: POLYGONAL AND POLYHEDRAL DISCRETIZATIONS FOR PARTIAL DIFFERENTIAL EQUATIONS

TRACK Number 4000

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**Key words:** Polygonal/polyedral unstructured meshes, Galerkin methods

ABSTRACT

Organizers The purpose of this minisymposium is to bring together researchers who develop and apply novel discretization techniques that extend the regime of standard finite element approaches for the solution of partial differential equations. A few examples of such technologies are: continuous and discontinuous Galerkin methods based on polygonal and polyhedral meshes, structure preserving mimetic discretizations, virtual element methods and finite element exterior calculus. The use of polygonal and polyhedral meshes with convex and concave elements provide greater flexibility in mesh design, and the discretizations on such meshes afford robustness in material design simulations, capturing flow in heterogeneous subsurface porous media, modeling of layered stratification of faults and fractures at geological sites, and reduced mesh-sensitivity to model complex pervasive fracture processes. These technologies have give rise to many new opportunities in computational mechanics as well as new mathematical challenges. Contributions to this minisymposium are solicited that emphasize methods development and/or applications to problems in engineering sciences that involve the use of polygonal and polyhedral discretizations. While contributions in all aspects related to these methods are invited, some of the featured topics will include:

* Generalized barycentric coordinates for polygons and polyhedra
* Discontinuous Galerkin and nonconforming finite elements on polyhedra
* Virtual element methods for linear and higher-order approximations
* Structure-preserving algorithms (mimetic and finite element exterior calculus) for multiphysics simulations
* Boundary element formulations
* Polygonal and polyhedral mesh generation algorithms
* Error estimates and convergence theory for polyhedral finite element discretizations
* Use of polyhedral meshes in applications such as flow simulations, material design and microstructural discretization, topology optimization and additive manufacturing, deformation of nonlinear continua, fracture, computer graphics and animations.

of MS proposals are requested to upload an abstract of approximately 400 words (1 page) no later than **June 30, 2021**, following the format of this template.

The abstract should briefly illustrate the contents and objectives of the Minisymposium. The list of prospective speakers is not required.

For practical reasons, each MS shall have a Corresponding Organizer, who will submit the MS proposal and keep in contact with the Conference Secretariat, and one or more Co-organizers.

Each MS should consist of a minimum of one Session (6 presentations of 20 minutes each or 5 presentations plus a 40m Keynote talk). The number of Sessions for a MS will be determined by the number of papers submitted. A MS cannot be split in parallel sessions.

For any further request, please contact the congress Secretariat:

[ECCOMAS2022@cimne.upc.edu](mailto:ECCOMAS2022@cimne.upc.edu)

**REFERENCES**

1. E. Oñate and M. Cervera, “Derivation of thin plate bending elements with one degree of freedom per node”, *Engng. Comput*., Vol. **10**, pp. 543561, (1993).

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