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Advanced discretization schemes for computational mechanics of structures, solids, fluids and their interaction

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Slender, thin-walled structures such as trusses, beams, plates and shells are not only ubiquitous in civil, automotive, aerospace and structural engineering, but also in many of tomorrow's engineering domains such as smart and adaptive structures or soft robotics. In recent years, an increased activity in the scientific field of formulations and discretization methods for thin-walled structures can be observed. The topic has received a major boost due to the popularity of the isogeometric concept along with finite element methods using NURBS or other smooth splines as shape functions. Beyond thin-walled structures, higher-order and smooth discretization schemes may also provide superior properties in the general fields of structural, solid and fluid mechanics, fluid-Structure interaction, multi-physics simulations, and contact, among others.

The proposed mini-symposium invites all contributions from the field of non-standard formulations and discretization methods for thin-walled structures, solids and fluids, both from method development and application. Typical topics are expected to be, but not restricted to:

- advanced discretization schemes like spline-based discretizations, subdivision surfaces, non-local (patch-based) or smoothed finite elements, meshless methods, collocation, fictitious or immersed boundary methods (finite cell method, CutFEM, CgFEM, etc.) or higher-order finite element methods

- relevant developments for practical and industrial applications, for instance the integration of CAD and CAE, treatment of boundary conditions, multi-patch coupling, trimmed surfaces, efficient numerical integration rules

- advanced formulations for solids, beams, plates, single-layer, multi-layer and solid shells, including aspects of locking, efficiency and robustness

- linear as well as geometrically and physically nonlinear problems

- computational fluid dynamics with stabilized fluid elements, adaptive mesh refinement and related topics

- fluid-structure-interaction and computational wind engineering

- further applications like design optimization, data assimilation in solid mechanics, stability and dynamic analyses, contact, multi-scale or multi-physics simulations