Università degli Studi di Pavia
Computational Mechanics & Advanced Materials Group - DICAr

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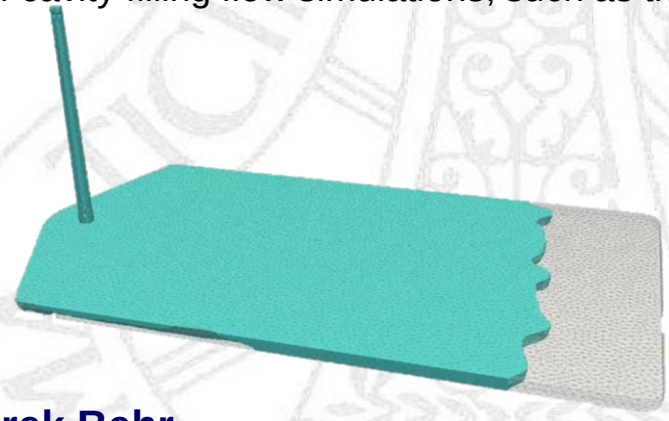
Virtual Modeling and Additive Manufacturing for Advanced Materials

SEMINAR

Unstructured Space-Time Meshes in the Context of Moving Boundary Problems

Moving-boundary flow simulations are an important design and analysis tool in many areas of engineering, including civil and biomedical engineering, as well as production engineering. Interface-capturing offers unmatched flexibility for complex free-surface motion, while interface-tracking approach is very attractive due to its better mass conservation properties at low resolution. We focus on these alternative approaches in the context of flow simulations based on stabilized finite element discretizations of Navier-Stokes equations, including space-time formulations that allow extra flexibility concerning grid design at the interface.

Space-time approaches offer some not-yet-fully-exploited advantages when compared to standard discretizations; among them, the potential to allow some degree of unstructured space-time meshing. A method for generating simplex space-time meshes has been developed, allowing arbitrary temporal refinement in selected portions of space-time slabs. The method increases the flexibility of space-time discretizations, even in the absence of dedicated space-time mesh generation tools. The resulting tetrahedral (for 2D problems) and pentatope (for 3D problems) meshes are being used in the context of cavity filling flow simulations, such as those necessary to design injection molding processes.



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October 2nd, 12:00pm (sharp)
DICAr MS1 Meeting Room
Via Ferrata, 3 – Pavia