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

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Virtual Modeling and Additive Manufacturing for Advanced Materials

SEMINAR

A Two-Dimensional Brittle Fracture Model for Thin Shells and Adaptive Simulations

We present a two dimensional model for brittle fractures of thin elastic shells, subject to deformations in the normal direction. In particular, we consider a two dimensional surface with a small thickness and model the brittle fracture energy in curvilinear coordinates by generalizing the model proposed by G.A. Francfort and J.-J. Marigò, and by considering the case of vector fields orthogonal to the reference surface. We obtain our model as the Gamma-Limit as the thickness tends to zero.
In the next step, we adapt the well-known Ambrosio-Tortorelli approximation for the Francfort-Marigò functional in order to obtain a phase field model. Driven by a time dependent boundary condition we can then compute a gradient-flow by an alternating minimization algorithm.
Furthermore, we introduce an anistropic mesh adaptation procedure to sharply capture the crack evolution. This approach allows us to considerably increase the efficiency of the discretization by avoiding any extra refinement in the areas where the material is sound, and by ensuring that the crack path is independent of the mesh

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August 29th, 11:00 (sharp)
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