ST01: Métodos avanzados de discretización
Advanced discretization methods

Organizers

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Session description

As the range of phenomena to be simulated broadens, the limitations of conventional numerical methods for solving particular challenging problems have become apparent. There are many problems of industrial and academic interest which cannot be easily treated with classical methods: for example, the simulation of manufacturing processes such as extrusion and molding, where it is necessary to deal with extremely large deformations of the mesh, or simulations of failure, where the simulation of the propagation of cracks with arbitrary and complex path is needed, or simulation of interface dynamics in multiphase flows, see Figure 1, to name a few.

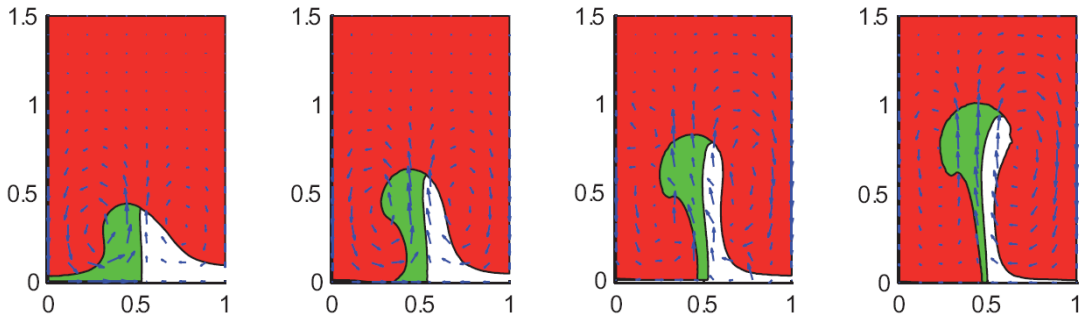

Figure 1 Multiphase flow X-FEM simulation

Moreover, the highly demanding requirements in terms of computational cost of conventional techniques make some realistic applications of interest (such as scattering of a radar electromagnetic wave by an aircraft, see Figure 2, or flow past an automobile) unaffordable in a reasonable computational time.

Several advanced discretization techniques have become very popular in the research community in the last decade, aiming to overcome the limitations of classical methods: eXtended Finite Elements (X-FEM), meshless methods, Discontinuous Galerkin Methods, efficient high-order computations, model reduction, etc.

This session focuses in the development, analysis and application of those advanced discretization techniques in the context of computational mechanics.

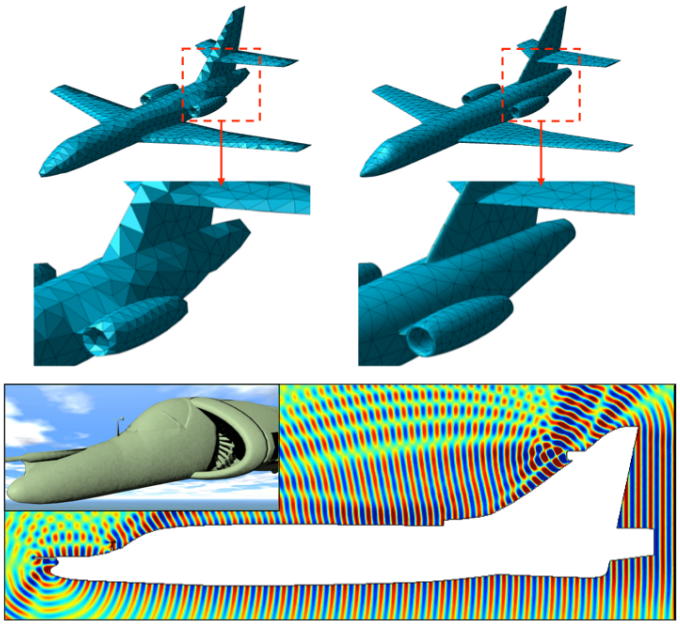

Figure 2 Scattering of a planar wave by an aircraft: linear and high-order geometry representation (top), DG simulation (bottom)