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ON THE INTERFACE MODELLING IN MULTI-MATERIAL PROBLEMS

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Multi-material modeling, such as Multi Fluids and Fluid-Structure Interaction (FSI), is a challenging engineering field. Problems requiring these strategies cover a broad range of applications, from macro structures to micro-devices. Currently there exists several techniques to reproduce the shape of the interfaces into the computational grid, being the embedded method a common choice to tackle this type of problems.

Embedded methods consist on using a fixed mesh and an algorithm to track the moving interface across this static computational grid. The advantage of this strategy is that large deformations are possible without the risk of obtaining inverted elements in the mesh. In Finite Element (FE) strategies, new shape functions are added at the elements split by the interfaces to improve its definition.

This work is focused on the hypothesis and limitations that raise when the FE field is enriched with extra shape functions to enhance the solution. Extending the field of unknowns does not automatically translate into more accurate solutions; a careful analysis is required to ensure optimal convergence of the method. In this study we will explain some aspects that have to be taken into account for the new FE space, together with other aspects of the interface definition using the PFEM-2.