Recent Advances in Non-intrusive Coupling Strategies.

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ABSTRACT

In the last decade, many innovative modeling or solution techniques have been introduced in the field of computational mechanics. These techniques, such as enriched finite elements or multiscale modeling, enable performing complex simulations that are out of reach of conventional finite element analysis (FEA) tools, in terms of computational or human costs. Although these techniques have proved their performance by extensive testing on academic applications, they are scarcely applied on actual industrial problems because they cannot be conveniently implemented into commercial FEA software packages. Therefore a scientific and practical challenge is to allow realistic simulation of complex industrial problems including all their physical and technological complexity.
The prerequisite of the proposed non-intrusive framework is to keep unchanged the global numerical model as well as the solver used for its treatment [1]. Therefore two or several models are used concurrently, the untouched global model and locals ones which are iteratively substituted where needed. The exchanges between the two models are such that the data should be "natural" ones for the global model such as prescribed forces. Possible applications are numerous [2] even though the approach as to be adapted depending on the context.

In this presentation we intend focusing on some recent works and associated possibilities and difficulties regarding:

- the extension of the method in explicit and implicit-explicit coupling in dynamics [3-4]
- the coupling between plate and 3D models for bolted and multi-bolted plates [5-6]
- the treatment of complex non-linear visco-plastic structures

This work is partially funded by the French National Research Agency as part of project ICARE (ANR-12-MONU-0002-04).

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