YIC GACM 2015
3rd ECCOMAS Young Investigators Conference
6th GACM Colloquium
July 20–23, 2015, Aachen, Germany

A weakly-intrusive multi-scale substitution method in explicit dynamics

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Keywords: PhD Olympiad, non-intrusivity, global-local coupling, explicit dynamics, co-simulation.

For virtual testing of composite structures, the use of fine modeling seems preferable to simulate complex mechanisms like delamination. However, the associated computational costs are prohibitively high for large structures. Multi-scale coupling techniques aim at reducing such computational costs, limiting the fine model only where necessary. The dynamic adaptivity of the models represents a crucial feature to follow evolutive phenomena. Domain decomposition methods would have to be combined with re-meshing strategies, that are considered intrusive implementations within commercial software. Global-local approaches are considered less intrusive, because they allow one to use a global coarse model on the overall structure and a fine local patch eventually adapted to cover the interest zone. In our work, we developed a global-local coupling method for explicit dynamics, presented in [1] and [2] and implemented in Abaqus/Explicit via the co-simulation technique for the simulation of delamination under high velocity impact.

References

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