

Aspects of sensitivity analysis and shape optimization for interfaces

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Abstract. This contribution is concerned with some aspects of sensitivity analysis and structural optimization for weak discontinuities occurring at interfaces in multimaterial structures. Different material properties lead to continuous stress distribution but discontinuous strain distribution along the interface. In general, strains and stresses must be controlled and limited in order to avoid stress concentrations at the interface leading to damage and failure.

This demand leads to stress based constraint functions in the optimization problem. Thus, special attention must be devoted to the stress computation at the boundary. The paper describes and compares different strategies based on the extended finite element method (X-FEM) on selected computational examples.

Furthermore, a corresponding sensitivity analysis must be designed in order to compute the stress variation at the interface caused by a variation of the interface itself. Here, different computational techniques for modelling interfaces are mentioned and compared due to the theoretical and computational effort for sensitivity analysis.

The talk describes the recent results of an ongoing project.

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