عنوان مقاله:

Crashworthiness Topology Optimization for Intrusion Minimization Using a Hybrid Evolutionary Approach

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خلاصه مقاله:

Topology optimization is a novel and powerful tool for reducing the weight of engineering structures which can be widely used in the design of vehicle components. Although the topology optimization is well developed in linear elastic approaches and fully adopted with gradient-based solvers, the crashworthiness topology optimization is still a big challenge. One of the main important problems is the existence of numerical noise in the crash simulations due to the highly non-linear behavior of the crash simulations which will be imported in the gradient information. Also, the presence of buckling bifurcation in the crash analysis may lead to some singularities in the objective function. Therefore, using efficient gradient-based solvers would be impossible and the conventional evolutionary methods would be inefficient. This paper presents the identified topologies derived from the newly developed hybrid evolutionary approach which can easily handle the numerical noise while handling the bifurcations as well.

کلمات کلیدی:

Crashworthiness, Topology Optimization, Metaheuristics, Weight Reduction, Moving Morphable Components.

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