

Topology Optimization of Composite Structures with Material Nonlinearity

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Abstract : Currently, topology optimization technique is widely used to define the layout design of structures that are presented as truss-like topologies. However, due to the difficulty in combining optimization technique with more realistic material models where their nonlinear properties should be considered, the achieved optimized topologies are commonly unable to apply straight towards the practical design problems. This study presented an optimization procedure of composite structures where different elastic stiffness, yield criteria, and hardening models are assumed for the candidate materials. From the results, it can be concluded that a more explicit modeling has the significant influence on the resulting topologies. Also, the isotropic or kinematic hardening is important for elastoplastic structural optimization design. The capability of the proposed optimization procedure is shown through several cases.

Keywords : topology optimization, material composition, nonlinear modeling, hardening rules

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