

Topology Optimization of Smart Structures with Embedded Piezoelectric Actuators

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An optimization formulation for determining the topology of compliant smart structures with embedded movable piezoelectric actuators is presented. The proposed method is capable of simultaneously optimizing the positions/orientation of the moveable PZT actuators and the layout of the host structure. A combined topology description model is used in this formulation. Here, a level set model is used to track the movements of the PZT actuators and the material distribution-based approach is utilized to search the optimal topology of the host structure. Moreover, an integral-type non-overlap constraint is considered to prevent overlaps between the PZT actuators and between the actuators and the external boundaries of the design domain in an efficient way. Numerical examples are given to demonstrate the effectiveness of the proposed optimization method.

Keywords: Topology optimization, Piezoelectric actuator, Compliant structure, Embedded component