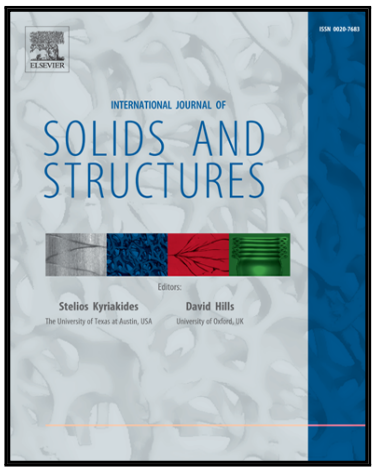

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Level set based structural optimization of distributed piezoelectric modal sensors for plate structures

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Abstract

This paper presents structural optimization of piezoelectric modal sensors and actuators for plate structures. Unlike for beam structures, the design of constant thickness, distributed modal transducers for plate structures is not straightforward. In this work the design problem for plate structures is tackled as a (multi-material) structural optimization problem where the optimal distribution of the piezoelectric material as well as its polarization profile have to be found. For the solution a parametric level set method is proposed. This allows simultaneous shape and topology optimization. In contrast to most conventional level set approaches we choose a parametric level set method that does not involve the direct solution of the Hamilton-Jacobi equation using numerical methods such as the finite difference method. The optimization problem is directly posed in terms of the parameters of the parameterization and is solved with an evolutionary algorithm.

Keywords: piezoelectric modal sensors, shape optimization, topology optimization, level set method, radial basis functions

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