



A note on optimal design of multiphase elastic structures

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The paper describes the first exact results in optimal design of three-phase elastic structures. Two isotropic materials, the "strong" and the "weak" one, are laid out with void in a given two-dimensional domain so that the compliance plus weight of a structure is minimized. As in the classical two-phase problem, the optimal layout of three phases is also determined on two levels: macro- and microscopic. On the macrolevel, the design domain is divided into several subdomains. Some are filled with pure phases, and others with their mixtures (composites). The main aim of the paper is to discuss the non-uniqueness of the optimal macroscopic multiphase distribution. This phenomenon does not occur in the two-phase problem, and in the three-phase design it arises only when the moduli of material isotropy of "strong" and "weak" phases are in certain relation.