

Two-phase isotropic composites with prescribed bulk and shear moduli.

T. Łukasiak

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ABSTRACT: The paper deals with the inverse homogenization problem: to reconstruct the layout of two elastic and isotropic materials given by bulk and shear moduli within a hexagonal (2D) periodicity cell, corresponding to the predefined values of the bulk and shear moduli, of the effective isotropic composite and to the given isoperimetric condition concerning the volume fractions. The effective isotropic moduli are computed according to the homogenization algorithm, with using appropriate Finite Elements (FE) techniques along with periodicity assumptions. The inverse problem thus formulated can be effectively solved numerically by the Sequential Linear Programming (SLP) method. The isotropy conditions, usually explicitly introduced into the inverse homogenization formulation, do not appear in the algorithm, as being fulfilled by the microstructure construction. The rotational symmetry of angle 120° of the resulting representative volume element is assumed.