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Bounds for Expansion Coefficients of Composites

Andrej Cherkaev, **Vladimir Vinogradov**

Department of Mathematics, University of Utah, Salt Lake City, USA

A method is suggested to bound the anisotropic effective stiffness and extension tensors of a multiphase composite made of expandable materials. The bounds are valid for composites of any microstructure. It is shown that the expansion coefficients vary an ellipsoid which parameters depend on properties of the phases, their fractions, and the effective stiffness of a composite. The obtained tensorial inequalities generalize bounds by Schapery, Rozen and Hashin, and Gibiansky and Torquato. Particularly, the bounds for the mixtures with voids are obtained.

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