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Bonifasi-Lista. *Inverse homogenization: Reconstruction of microstructural information from the effective properties of a composite material.*

Inverse homogenization is a problem of deriving information about the microstructure of a composite medium from homogenized or effective measurements. The approach is based on the reconstruction of the spectral measure in the analytic Stieltjes representation of the effective tensor, the spectral measure contains all information about the microgeometry. The problem of identification of the spectral function from effective measurements in an interval of frequency has a unique solution, however the problem is ill-posed. We discuss several stabilization techniques as well as Pade approximations used to reconstruct the spectral function. We show results of reconstruction of microstructural parameters of a mixture of two materials with different complex permittivity and in a problem of torsion of a heterogeneous beam made of elastic and visco-elastic materials. (Received February 07, 2006)