1092-35-301    **Elena Cherkaev\*** (`elena@math.utah.edu`), University of Utah, Department of Mathematics, 155 South 1400 East, JWB 233, Salt Lake City, UT 84112. *Inverse problem for the structure of composite materials.*

The talk discusses inverse homogenization problem which is a problem of deriving information about the microgeometry of a two-component composite media from given effective properties. The approach is based on reconstruction of the spectral measure of a self-adjoint operator that depends on the geometry of composite. Stieltjes analytic representation of the effective property relates the n-point correlation functions of the microstructure to the moments of the spectral measure, which contains all information about the microgeometry. I show that the problem of identification of the spectral function from effective measurements known in an interval of frequency, has a unique solution. In particular, the volume fractions of materials in the composite and an inclusion separation parameter, as well as the spectral gaps at the ends of the spectral interval, can be uniquely recovered. The talk discusses reconstruction of microstructural parameters from electromagnetic and viscoelastic effective measurements, coupling different effective properties, and an extension to nonlinear composites. (Received August 12, 2013)