
Odd elasticity as the multi-continuum homogenization limit of Cosserat elasticity

Grigor Nika*¹

¹Karlstad University [Sweden] – Sweden

Abstract

We derive an effective system from a periodically heterogeneous Cosserat continuum. The homogenization process encompasses intrinsic lengths related to scale-size effects and leads to an asymmetric effective stress which requires an extra balance of torques and is related to concept of *odd elasticity*. The corresponding local problem exhibits asymmetry as well, due to the micropolar couple modulus inherited from the original microscopic Cosserat problem. We validate our results by conducting numerical simulations using the finite element method on circularly perforated square and rectangular unit cells, highlighting the impact of the micropolar couple modulus on effective coefficients. Furthermore, we numerically show that there exists a threshold micropolar couple modulus which affects the behavior of the cell and compare the cell displacement in the presence and absence of a micropolar couple modulus.

*Speaker