

1145-74-1383

**Graeme Milton, Mark Briane and Davit Harutyunyan\*** (harutyunyan@math.ucsb.edu),  
University of California Santa Barbara, Department of Mathematics, South Hall, Room 6607,  
Santa Barbara, CA 93106. *On the possible effective elasticity tensors of 2 and 3 dimensional  
printed materials.*

In this talk we present a partial characterization of the set of effective elasticity tensors of metamaterials built from a stiff material and void in given volume fractions. The sought set of effective tensors is completely characterized through minimums of sums of energies, involving a set of applied strains, and complementary energies, involving a set of applied stresses, we provide descriptions of microgeometries that in appropriate limits achieve the minimums in many cases. In these cases the calculation of the minimum is reduced to a finite dimensional minimization problem that can be done numerically. Each microgeometry consists of a union of walls in appropriate directions, where the material in the wall is an appropriate p-mode material, that is easily compliant to  $p \leq 5$  independent applied strains, yet supports any stress in the orthogonal space. This is joint work with Graeme Milton and Mark Briane (Received September 21, 2018)