

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Modeling the Mechanical Metamaterials with Confinement Controlled Response. NITIN SINGH, CORENTIN COULAIS, BASTIAAN FLORIJN, MARTIN VAN HECKE, Univ of Leiden / AMOLF — Much of the physics of two dimensional mechanical metamaterials can be understood from tiling of rigid-polygons connected by hinges. Here we map recently introduced programmable mechanical metamaterials which are elastic slabs patterned with circular holes of two different sizes to a tiling of hinged rectangles. Torsional springs in the hinges and linear springs at the outside of this mechanism allow us to capture the experimentally observed mechanical response, and we connect the physical design parameters to the shape of the rectangles, and the strength of the torsional springs. We finally show that this soft mechanism provides us with an inverse design tool for metamaterials.

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Date submitted: 05 Nov 2015

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