Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Experimental study of one-dimensional acoustic metamaterials of sound-soft inclusions.[1] CAMILA HORVATH, MARíA LUISA CORDERO, DFI, FCFM, Universidad de Chile., AGNÈS MAUREL, Institut Langevin, ESPCI ParisTech, CNRS UMR 7587. — We are studying the properties of a one-dimensional acoustic metamaterial. The metamaterial consists in a periodical array of rectangular cross section pillars, made of a sound penetrable material (air) built-in a medium with higher acoustic impedance (Polydimethylsiloxane). We are focused on the acoustic response, when the periodicity of the array is several orders of magnitude lower than the wavelength of the incident wave. The problem is being studied experimentally and theoretically, using homogenization methods (Marigo, 2018, RSPA; Maurel, 2014, JASA) to simulate acoustic response of the array and comparing these results with the experimental measurements. Using lithography and soft lithography techniques, we fabricate the metamaterial, shaping a microscale periodical structure of rectangular cross section air bubbles within a Polydimethylsiloxane media. In order to reproduce a one-dimensional array, the air bubbles are pillars with a length, normal to its cross section, four orders of magnitude larger than the periodicity of the structure. We study experimentally the acoustic wave transmitted and reflected by the metamaterial. We find that it behaves as a perfect reflector for a wide range of frequencies.

[1]PhD. student finance by CONICYT National PhD-fellowship (2016) No. 21161479. Funding from the millennium nucleus physics of active mater, FONDEQUIP EQM140055 and Fondecyt grant No. 1170411 are acknowledge.

Camila Horvath
DFI, FCFM, Universidad de Chile.

Date submitted: 03 Sep 2019 Electronic form version 1.4