Student project/ Bachelor thesis/Master thesis

Computational analysis of phononic and photonic crystals

Metamaterial is artifical or synthetic material that consists of periodic constituents to imitate the behavior of crystalline material. Photonic and phononic crystals are the two main classes of metamaterial that govern electromagnetic and elastic waves, respectively, which can be deliberately designed to achieve unconventional wave characteristics that cannot be found in natural material, e.g. wave guiding, cavity mode, cloaking.

In this work, a computational analysis of photonic and phononic crystals will be developed based on Finite Element Method (FEM). Specifically, bulk, plate and surface mode photonic/phononic crystals will be investigated as a foundation to study different special wave phenomena.

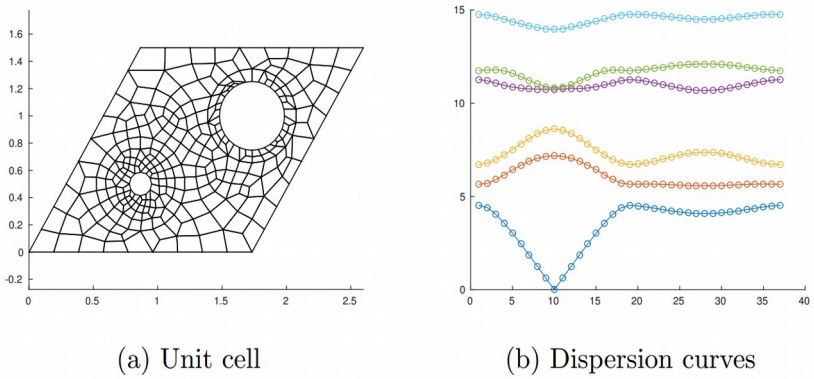

Fig. FEM mesh and phononic energy band diagram

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Requirements: No requirement

Objectives:

Fundamental understanding about photonic/phononic crystals (Bloch's theorem)

Develop and veriffy computational model (energy band and transmission diagram)

Investigate unique wave phenomenon (wave guiding, cavity mode, cloaking,...)

Termin:

From 01.08.2018

To 01.12.2019

Institut für Kontinuumsmechanik