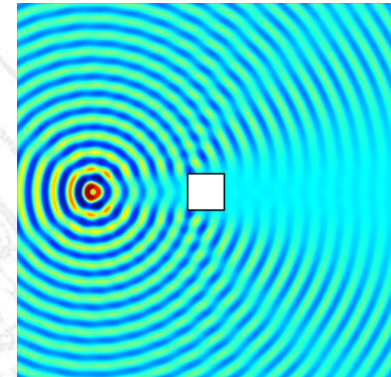


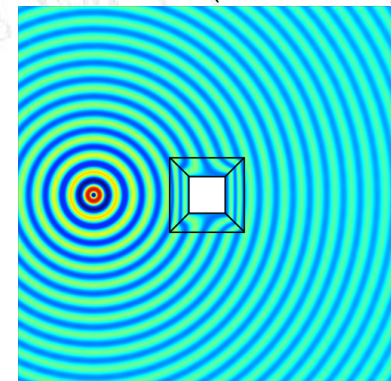
Controlling wave propagation in elastic structures: quasiperiodic waveguides and structural metamaterials for cloaking flexural waves

The seminar will cover research on two topics of wave propagation in elastic structures. In the first part, the band structure of dispersion diagrams for axial and flexural waves of quasiperiodic infinite beams is investigated. Every structure is composed of a repeated elementary cell generated adopting the Fibonacci sequence. It is shown that, for different Fibonacci sequences, the number of stop/pass bands within a defined range of frequencies changes and follows the Fibonacci recursion rule, showing a self-similar pattern. In addition, the overall dispersion characteristic can be interpreted in terms of an invariant function of the circular frequency, independent of the sequence generating the elementary cell.

The second part addresses an important issue of cloaking transformations for fourth-order partial differential equations representing flexural waves in thin elastic Kirchhoff plates, providing a formal framework for transformation elastodynamics as applied to elastic plates. An algorithm is proposed for designing a broadband square cloak for flexural waves, which employs a regularised push-out transformation. Illustrative numerical examples show high accuracy and efficiency of the proposed cloaking algorithm. This result constitutes the first rigorous attempt to obtain a structural metamaterial able to shield objects from the interaction of bending waves.



Uncloaked void (flexural waves)



Cloaked void (flexural waves)

Prof. Massimiliano Gei
Università degli Studi di Trento

January 20, 3:00pm (sharp)

DICAR MS1 Meeting Room

Via Ferrata, 3 – Pavia