

Structural integrity under extreme loads

Topic: Lightweight protective structure

TITLE: Design of of structure to maximize energy absorption in case of extreme loading conditions

RESEARCH BACKGROUND:

Structures need to be protected from extreme loading conditions for improving their safety and avoid fatal accidents. Designing lightweight solutions with customizable and broadband energy absorption capabilities is crucial for guaranteeing satisfactory protective performance regardless of the frequency bands excited characterizing the external loads.

RESEARCH ACTIVITIES:

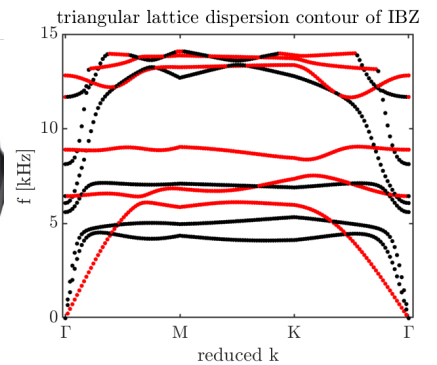
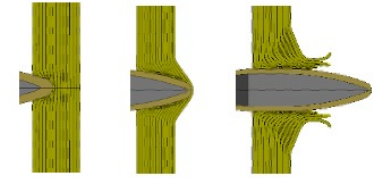
1. Literature review of innovative approaches for energy absorption in case of extreme loading conditions.
2. Design of innovative solutions.
3. Assessment of the performance of the identified solution.

METHODOLOGY: Analytical-Numerical (possibly also experimental)

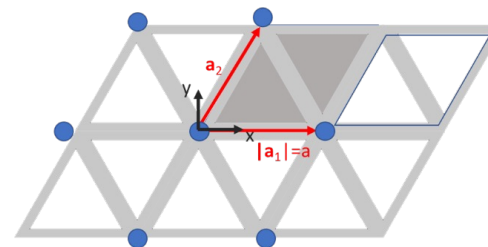
DURATION: 6-9 months

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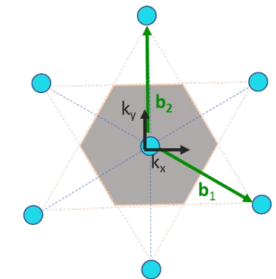
Position Space: Direct Lattice
(chosen) Primitive unit cell [nonunique]



$$R = c_1 a_1 + c_2 a_2$$

Where $|a_1| = |a_2| = a$

Wavenumber Space: Reciprocal Lattice
First Brillouin Zone [unique]



$$R^* = c_1^* b_1 + c_2^* b_2$$

Where $|b_1| = |b_2| = \frac{\sqrt{4/3}}{2} \pi + 4\pi / (\sqrt{3}a)$