Visualization of topologically protected modes of mechanical lattices

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November 29, 2021

Abstract

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1 Introduction

Acoustic metamaterials, sometimes called also Elastic metamaterials or Mechanical metamaterials, are defined as man-made structures that display acoustic or elastic wave properties not found in nature. This field is rapidly growing [1,2,3].

The recent hottest topic in this field is the use of topological protected modes, which have characteristics of robustness and nonreciprocal features when time-reverse symmetry is beaked. It is known that hexagonal mechanical lattices have typical band shapes in their dispersion relation which are called Dirac cones. By adding small modulations to Dirac cones, we can realize topological protected modes [4].

By adding rotational modulation into a spring-mass type wave machine, we could break time-reversal symmetry by Coriolis force. Then we could realize one-directional topologically protected edge modes [5]. introduction

2 Background

2.1 brillouin zone

What is brillouin zone? Why using brillouin zone?

2.2 Bloch theory

What is Bloch theory?

WHy using Bloch theory?

2.3 SSH model

2.4 Chern number

2.5 Topological insulator

What is topology?

What is insulator?

What is topological insulator?

What is Hall effect and Quantum hall effect?