SEMINAR - סמינר

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ב' 2.12.2019
(ד' בכסלו תש"פ), בניין דן קאהן, אודיטוריום 1, 14:30.

מרצה:

Dr. Lea Beilkin

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Department of Condensed Matter Physics
The School of Physics and Astronomy, Tel-Aviv University
(PhD 2016, Mechanical Engineering, Technion-Israel Institute of Technology)

על הנושא:

Feedback-based topological mechanical metamaterials - designing unconventional wave propagation in real-time

The seminar will be given in English

להלן תקציר ההרצאה:

Controlling wave propagation in mechanical/acoustic systems is an essential requirement in advanced engineering applications, such as acoustic imaging, acoustic signature cloaking, noise cancellation, vibration suppression and more. Recently, there was introduced an idea to exploit an originally quantum phenomenon, denoted by topological insulation, to achieve unconventional wave behavior in classical materials and structures. The topological phenomenon supports wave propagation along interfaces or boundaries that is immune to back-scattering in the presence of localized imperfections and sharp corners. The spotlight of the current research in modern physics and engineering includes the design of artificial structures (or metamaterials), which accommodate topological properties through the collective behavior of their unit cells.

To date, most of the research has considered passive structures with unit cells of fixed geometry. However, it becomes more and more evident that the full potential of topological metamaterials cannot be realized with purely passive designs, due to the following reasons: (i) once a passive structure is fabricated it has fixed dynamic properties at a given frequency, and (ii) a variety of topological phenomena can be obtained only with active involvement.

In the talk I am going to present the concept of active topological metamaterials whose underlying mechanism is based on real-time feedback control. I will show how embedding electronic transducers in a plain panel and operating them in real-time according to targeted control algorithms, can generate various topological effects at an adjustable frequency range. The algorithms can be switched to a different functionality upon request. I will demonstrate how this concept lends itself to the new direction of programmable feedback-based materials for general wave guiding purposes.

מארח: פרופ' אולג גנדלמן

בברכה,

פרופ"מ מתי' סוס
מרכז הסמינרים