הטכניון – מכון טכנולוגי לישראל **הפקולטה להנדסת מכונות**

סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ב' 8.08.16 (ד' באב, תשע"ו), בבניין דן-קאהן, קומה 0, אודיטוריום 1, 14:30.

יצרה: שלמה (קיריל) וורוטניקוב

מנחה: פרופ"מ יולי סטרוסבצקי

על הנושא:

2D wave manipulation in the acoustic metamaterials with local inertial coupling

The seminar will be given in Hebrew

להלן תקציר ההרצאה:

Mechanical metamaterials are engineered systems possessing selected material properties which are mainly affected by a unit-cell element structure rather than material composition. Dynamics of metamaterials is a subject of growing interest in various fields of applied physics and engineering. Since the pioneering work by Liu, the new class of acoustic metamaterials, has been introduced and broadly considered in various experimental and theoretical works of the past decade. This special type of dynamical systems is usually referred to in the literature as locally resonant metamaterials (LRSM) and is characterized by the presence of the local resonators embedded in their internal structure. One of the advantages of these unique models is their ability to form the low-frequency band gaps.

In this study we consider the two-dimensional nonlinear mechanisms of bidirectional and unidirectional wave channeling emerging in the locally resonant, 2D acoustic structures.

The first part of my talk is devoted to the nonlinear analysis of the channeling phenomena exhibited by the unit-cell model comprising an outer mass incorporating the internal rotating inclusion and subject to the 2D, nonlinear local potential. We analyze the mechanisms of formation and bifurcations of the regimes, of bidirectional energy channeling as well as the unidirectional entrapment in the limit of high energy pulsations.

In the second part of my talk I will focus on the analysis of the regimes of two-dimensional, energy channeling forming in the limit of low amplitude excitations. In the considered limit, we report the emergence of all new regimes manifested by partial and complete transformations of axial vibrations to the lateral ones. Here, we also show that regimes corresponding to the bidirectional energy wandering and these of spontaneous locking discussed in the first part of my talk - persist in the low amplitude limit as well.

In the final part of my talk I will discuss the complex mechanism of the 2D wave channeling emerging in the acoustic metamaterials with the quasi one-dimensional as well as the two dimensional locally resonant structure. I will present the analysis of special resonant wave-wave interaction states. Based on the results of nonlinear analysis of these unique regimes we will demonstrate the different scenarios governing the recurrent as well as the irreversible mechanisms of 2D wave transformation (shear-longitudinal) in the complex, periodic acoustic structures (quasi 1D chain, square lattice).

בברכה,

שרון אמיר

מרכז הסמינרים