Technion-Israel Institute of Technology
Faculty of Mechanical Engineering

הטכניון-מכון טכנולוגי לישראל
הפקולטה להנדסת מכונות

סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ה' 24.01.2019 (יח' בשבט, תשע"ט), בניין דן קאהן, אודיטוריום 1, 13:30.

מרצה: בן לוסטיג

מנחה: פרופ"מ גל שמואל

על הנושא:

On the band gap universality of multiphase laminates and its applications

The seminar will be given in Hebrew

תקציר ההרצאה :

The band structure of a periodic medium describes which wave frequencies, termed gaps, it filters out, depending on the medium composition. Shmuel and Band (2016) discovered that all infinite band structures of two-phase laminates impinged by normal waves are remarkably encapsulated in a finite geometrical object, independently of the specific laminate composition. We unveil a generalized object that encapsulates the band structures of all multiphase laminates. The merit of such a universal object is more than mathematical beauty—it establishes a platform for unprecedented characterization of the band structure. We specifically exploit it to rigorously determine density of the gaps in the spectrum, and prove it exhibits universal features. We further utilize it to formulate optimization problems on the gap width and develop a simple bound. Using this framework, we numerically study the dependency of the gap density and width on the impedance and number of phases. In certain settings, our analysis applies to non-linear multiphase laminates, whose band diagram is tunable. Through simple examples, we demonstrate how the universal object is useful for tunability characterization. Our insights may establish a step towards engineering filtering devices according to desired spectral properties.

References

G Shmuel and R Band. Universality of the frequency spectrum of laminates. J. Mech. Phys. Solids, 92:127–136, 2016. ISSN 0022-5096. doi: http://dx.doi.org/10.1016/j.jmps.2016.04.001.

בברכה,

פרופ"א מתי סאס
מרכז הסמינרים