סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ה׳ 27.02.2020 (ב׳ באדר, תש״פ), בניין דן קאהן, אודיטוריום 1, 13:45.

מרצה: שמואל כץ

מנחה: פרופ׳/ח ספי גבלי

על הנושא:

Non-linear phenomena in the response of bistable chains to impact

The seminar will be given in Hebrew

תקציר ההרצאה :

The design of architectured materials with bistable building blocks holds exciting possibilities. This new class of metamaterials exploits micro-level structural instabilities to obtain extraordinary physical and mechanical properties. Still, the dynamic behavior of these lattice structures is largely unexplored. Here, we study the dynamic response to impact of a 1-D bistable lattice, i.e. a FPU chain with springs having a non-convex double-well energy potential. In addition to metamaterials, this model-problem is prototypical to a large number of systems, such as unfolding/refolding of proteins, crack propagation, plasticity, and mechanisms underlying martensitic phase transformations. We show that, depending only on the stiffness-ratio associated with the two energy wells of the bistable springs, the system exhibits two fundamentally different responses to impact; (i) when the stiffness in the secondary well is smaller than that of the primary well, the impact energy is (almost entirely) trapped in the form of large undulations of the first few springs, and unique phenomena such as boomerons emerge. This is the first time a boomeron is observed in a free-standing lattice. (ii) On the other hand, when the stiffness in the secondary well is larger, the energy of the impact is (almost completely) transferred along the chain in the form of a solitary wave that involves transition to the secondary energy-well and back. Results for the abovementioned nonlinear phenomena, based on analytical treatment as well as numerical simulations, will be presented and discussed.

בברכה,

פרופ"א אתי סאס
מרכז הסמינרים