SEMINAR - סמינר

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ב׳ 12.04.2021
(כ״ג בניסן תשפ״א), בשעה 14:30 באמצעות הזום: https://technion.zoom.us/j/93979120991

מרצה: **Dr. Lior Medina**

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על הנושא:

Tristability, simulations mode actuation, and limit point behaviour in initially curved coupled micro beams

שלושה שיווי משקל, עירור מודים מקבילי והתנהגות נקודות הקצה בקורות עקומות מצומדות

The seminar will be given in English

להלן תקציר ההרצאה:

Curved structures have been regarded as a benchmark problem for the study of nonlinear structures, presenting a myriad of complex responses, even more so when under the influence of nonlinear, displacement-dependent, electrostatic load. Recently, the focus has gravitated to two-dimensional structures such as plates and shells, as well as Kirigami based structures, which added to the overall complexity of their analysis, theoretically as well as experimentally, while ensuing investigations as to their intrinsic stability behaviour and potential applications. With the entrance of coupled structures into the fold, new insights have offered a glimpse to uncharted territories, heretofore unencountered, where nonlinear phenomena are inherently pronounced or alternately, controlled, while presenting complex behaviour that can even match two-dimensional structures. Among such phenomena is multi-stability, emanating from the coupling of two bistable constructs, forming a complex metastructure. Indeed, multi-stability, which has more than two stable equilibria, has been a highly sought-after property for a long time. The incentive for their study lies in their potential, exemplified through applications, which benefit from an increased number of values. Among such applications it is possible to name non-volatile mechanical memoirs (NVMM), where a multi-valued element can lead to higher storage density, allowing to store more date due to increased number of bits. However, current studies have either produced structures too cumbersome for fabrication on the one hand, or too large (in the centimetre scale) on the other hand, making it difficult to realise micro multi-stable applications. In the current study, a comprehensive and rigorous analysis is carried for a double beam metastructre via reduced order (RO) modelling, arc-length “Riks” continuation method, and multi degree-of-freedom (DOF) dynamics, to characterise and disclose capabilities embodied in such a structure, beyond bistability.

On the whole, it is shown that while such a structure may seem to be innocuous and simplistic at first glance, it holds a vast range of intrinsic responses, hitherto unknown, from parallel mode actuation to several forms of tristability. By acquiring the ability to transform such a structure to become bistable or tristable, depending on defining parameters, a whole new frontier of multistable based applications can arise on the microscale, while also providing a model that can be used by engineers in the early design stages. In addition, when taking into account the different multistable structures that were investigated up until now, it is also evident that the present study brings forth a relatively compact structure, promoting the miniaturisation of various applications, such as a three bit NVMM, multi valued logical gate, multi-acceleration threshold sensors, and even energy harvesting.

מארח: פרופ׳ אולג גנדלמן

בברכה,

פרופ״ח אתי סאס
מרכז הסמינרים