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' 13.09.2018 (כ"ה בתשרי, תשע"ט), בניין דן קאהן, אודיטוריום 1, 14:30.

מרצה: נטע פריבמן

מנחה: פרופ'/ח יולי סטרוסבצקי

על הנושא:

Dynamics of the 2D oscillator with internal rotatory attachment: effect of geometric nonlinearity

The seminar will be given in Hebrew

תקציר ההרצאה :

Of late, dynamical systems comprising the primary structure with internal rotators have attracted substantial attention of researches from diverse engineering communities. Many theoretical and experimental works have been devoted to the study of 1D response of dynamical systems comprising the primary structure with internal rotators, subject to various types of external loading. In these models, the primary structure is constrained to move in a single direction. Some of these studies have shown that internal rotator can be used as a nonlinear energy sink, which allows for a broadband energy absorption from the impulsively loaded primary system in the irreversible fashion. Some very recent works have been concerned with the 2D response of mechanical structure incorporating internal rotator. These works have shown that the motion of a primary structure initiated in a certain direction can be gradually redirected e.g. from horizontal to vertical vibrations. This mechanism is fully controlled by the motion of internal rotator. Motivated by some recent studies, we investigate the effect of geometric nonlinearity on the 2D response of mechanical model comprising the 2D oscillator with internal rotator. The 2D oscillator comprises the mass which is mounted on the 2D elastic support assembled from the four linear springs placed in horizontal and vertical directions. The mass of internal rotator is assumed to be significantly smaller than the mass of a primary structure. In the present research we aimed at devising the analytic approach based on asymptotic analysis enabling to depict the stationary and non-stationary, 2D response of the outer element controlled by the motion of internal rotator. The analytic part of the study has involved the regular multi-scale analysis, which has been performed under assumption of small amplitude motion of a primary structure. Results of the analysis have been validated by the direct numerical simulations of the original system under consideration. In this presentation we will depict the complete bifurcation structure of stationary response regimes and will characterize the special nonstationary system states manifested by intense, energy transfer from horizontal to vertical vibrations.

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בברכה,

פרופ"א מתי סאס
מרכז הסמינרים