הטכניון TECHNION
מכון טכנולוגי לישראל Israel Institute of Technology

הפקולטה להנדסת מכונות Faculty of Mechanical Engineering

סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ה׳ 12.08.2021
(ד׳ באלול, תשפ״א), בשעה 13:00 באמצעות הזום : https://technion.zoom.us/j/99253779463

מרצה : יובל הופמן

מנחה : פרופ׳ אולג גנדלמן

על הנושא:

Transition to 3D motion in an equivalent mechanical model of nonlinear liquid sloshing

The seminar will be given in Hebrew

תקציר ההרצאה :

The thesis considers transtiton from two-dimensional to three-dimensional response (swirling) in a problem of liquid sloshing in a symmetric vessel under external periodic forcing. Such transition is well-known in the vicinity of the primary 1:1 resonance between the lowest eigenfrequency of the sloshing mass, and the external force. The thesis analyzes the possibility to describe the transition by means of reduced-order dynamical model.

The suggested model comprises planary damped nonlinear oscillator with unidirectional forcing. The transition to the sloshing is associated with loss of stability of the one-dimensional response. Analysis by means of a multiple-scaple expansion allows mapping the transition threshold at the plane of parameters for given initil conditions. One reveals that common cubic nonlinearity is insufficient to match the available numeric and experimental results; more complicated cubic-fifth order model with combined softening and stiffening is required. The results are verified by means of direct numeric simulations that reveal additional response patterns, including the two-dimensional chaotic responses. Such responses were also observed in realistic sloshing systems.

בברכה,

פרופ״ח מתני סאס
מרכז הסמינרים