

## סמינר - SEMINAR

הנד מוזמנת/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ב' 16.02.15 (כז' בשבט, תשע"ה), בבניין דן-קאהן, קומה 0, באודיטוריום 1, שעה 14:30.

ירצה:

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על הנושא:

## NONLINEAR NORMAL VIBRATION MODES AND THEIR APPLICATIONS IN DYNAMICS OF ELASTIC SYSTEMS

להלן תקציר ההרצאה:

Nonlinear normal vibration modes (NNMs) are a generalization of the normal vibration modes in linear systems. In regime of the NNM, a finite-dimensional system behaves like a conservative one having a single degree of freedom. By the **Kauderer-Rosenberg concept** in regime of the NNM all position coordinates can be analytically parametrized by some selected coordinate,  $x_i = p_i(x)$ ; ( $i = 2, 3, \dots, n$ ). This concept is effective for conservative and near-conservative systems. The **Shaw-Pierre concept** of NNMs is effective in quasilinear dissipative systems. Corresponding analysis is based on the computation of invariant manifolds on which the NNMs take place. Two dominated phase coordinates  $u, v$  (so-called "master coordinates") are selected, and other phase coordinates are presented as functions of the selected ones,  $x_i = X_i(u, v)$

The Kauderer-Rosenberg concept is used in analysis of the NNMs in some pendulum systems. This concept is used in some vibro-absorption problems too. Free and forced vibrations of mechanical systems, containing the linear subsystem coupled with a nonlinear absorber, are considered. The essentially nonlinear oscillator, the snap-through truss, the pendulum and the vibro-impact oscillator are chosen as absorbers. The localized and non-localized NNMs are analyzed. If the stable localized mode is realized, the system energy is concentrated in the nonlinear absorber; it is the most appropriate case to absorb vibrations of the linear subsystem. NNMs by Kauderer-Rosenberg are used to analyze the cylindrical shell nonlinear dynamics in a framework of the Donnell theory. The shell with initial imperfections in the supersonic flow is considered.

The Shaw-Pierre concept of NNMs is used to analyze the 7-DOF nonlinear model of the double tracked road vehicle. The NNMs of forced vibrations are investigated in the rotor system with the isotropic-elastic shaft. Asymmetrical disposition of the disk in the shaft, gyroscopic effects, nonlinear flexible base and internal resonance are taken into account. Combination of the Shaw-Pierre NNMs and the Rauscher method is used to construct the forced NNM and the corresponding frequency responses.

בברכה,

המארח: פרופ' אולג גנדלמן

פ' 19/01'11 א"י טת

מרכז הסמינרים