סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ד' 10/11/21 (ו' כסלו, תשפ"ב), בשעה 13:30 באמצעות הזום: https://technion.zoom.us/j/93154504917

מרצה: אפיק ליפשיץ

מנחה: פרופ' יצחק בוכר

על הנושא:

Analytical analysis of Autoresonance in systems including gyroscopic effects

The seminar will be given in Hebrew

תקציר ההרצאה:

The field of rotordynamics, which includes a wide range of mechanical structures and applications, is characterized by a phenomenon known as the "gyroscopic effect". This term refers to an internal momentum within a rotating structure, causing the mode-shapes and the eigenfrequencies to be speed dependent, and to split to two components (forward and backward). Thus, information about the systems eigenvalues at standstill is not sufficient, and modal testing of such system requires tracking of the changes of the eigenvalues .

Autoresonance (AR) is a self-excitation technique which automatically excites systems at their natural frequency. The method is based on a nonlinear feedback loop, including a digital relay, in order to excite the system at a constant amplitude. A system which is subjected to AR can reach steady-state within few seconds, vibrating at the system's eigenfrequency. In case of rotordynamics, the main advantage of AR over other identification methods, is the fact it can track the system eigenvalues as they change, and map them as function of the velocity .

While previous researches have proven the possibility to isolate a particular modal component and extract its eigenfrequencies, using a proper modal filter, they have failed to isolate between the forward and backward rigid-body modes, which are highly affected by the bearing stiffness asymmetry .The current research presents an analytical approach for Autoresonance in multi degrees-of-freedom rotating systems, based on modal decomposition adapted to systems including gyroscopic effects, and asymmetry of the bearings stiffness. The model enables identification of the natural frequencies, mode shapes and modal damping ratios. Numerical simulations are shown to validate the analytical model.

בברכה,

פרופ"ח מתי' סלס

מרכז הסמינרים