STABILITÉ DES SYSTÈMES MÉCANIQUES

STABILITY OF MECHANICAL SYSTEMS

Lecturers: Jean-Jacques SINOU

| Lecturers : 16.0 | TC : 0.0 | PW : 0.0 | Autonomy : 0.0 | Study : 12.0 | Project : 0.0 | Language : FR

Objectives

When designing structures and mechanical systems, it is imperative to control the risks of instability arising from many phenomena. Mention may in particular be made of the various couplings of a non-conservative nature related to the existence of friction or of contact between a moving elastic structure and a fluid or a solid. Moreover, the phenomena of buckling and blistering are increasingly dimensioning given the lightening of the structures associated with the use of new materials. In the fields of transport, civil engineering and energy, we can cite: brake noise, resistance to crashes, instabilities of rotating machines, risk of building collapse, stability of drilling systems.

Keywords : Stability, brake squeal, fluid-structure, rotating machines, aeroelastic coupling, hydro-elastic coupling

Programme

I. Introduction and illustration from industries
II. Buckling of elastic structures
III. Non-conservative elastic structures
IV. Stability of mechanical systems and vibration
V. Practical methodology in engineering and research units.
VI. Applications to mechanical systems with friction and structures coupled with flow

Learning outcomes

- Develop a synthetic vision of the risks of instabilities of mechanical systems in the design process
- Learn about computational tools to predict instabilities
- Understand the coupling phenomena at the origin of the instabilities

Independent study

Objectifs : Learning and deepening part of the course.

Méhodes : Bibliographic analysis and reflection on a problem of application

Core texts

Wanda Szemplinska-Stupnicka., *THE BEHAVIOR OF NONLINEAR VIBRATING SYSTEMS VOL 1. FUNDAMENTAL CONCEPTS AND METHODS : APPLICATIONS TO SINGLE-DEGREE OF FREEDOM SYSTEMS.*
Robert D. Blevins. *FLOW-INDUCED VIBRATION*
Roland Bigret*STABILITÉ DES MACHINES TOURNANTES ET DES SYSTÈMES*

Assessment