



## DYNAMIQUE DES STRUCTURES

### STRUCTURAL DYNAMICS

Lecturers: Olivier DESSOMBZ

| Lecturers : 16.0 | TC : 0.0 | PW : 8.0 | Autonomy : 0.0 | Study : 4.0 | Project : 0.0 | Language : FR

#### Objectives

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The dynamic analysis of structures using modal synthesis and finite element methods has found a large number of industrial applications (aeronautics, automotive, shipbuilding, rail, civil engineering). The main goal of this course is to present these methods in a general framework by carrying out in parallel and in interaction a numerical approach and an experimental approach based on vibratory tests. Model correction and the influence of damping are also discussed.

**Keywords :** Finite elements - modeling - numerical methods - numerical modal analysis - substructuring - modal synthesis - damping

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#### Programme

- Discretization by finite elements
- Modification of the global matrix formulation
- Standard conservative problem
- Spectral problem
- Temporal integration of the transient problem
- Modeling of damping
- Identification of the damping matrices
- Modal synthesis, Sub-structuring
- Disturbance of dynamic models

#### Learning outcomes

- Model a finite element structure
- Use a general industrial finite element calculation code
- Understand the foundations of finite element methods
- Implement vibration measurements

#### Independent study

**Objectifs :** Finalize the TP and BE, write the reports

**Méthodes :**

#### Core texts

J.-F. IMBERT, *ANALYSE DES STRUCTURES PAR ÉLÉMENTS FINIS (3ÈME ED)*, Cepadues, 1995  
M. GERARDIN, D. RIXEN *THÉORIE DES VIBRATIONS*, Masson, 1996  
L. MEIROVITCH *COMPUTATIONAL METHODS IN STRUCTURAL DYNAMICS*, Sijthoff Nordhoff, 1980

#### Assessment

Score = 50% knowledge + 50% know-how  
Knowledge score = final exam  
Know-how score = continuous assessment