



# LISMMMA

Research @ Supméca

# LISMMA

Laboratoire d'Ingénierie des Systèmes  
Mécaniques et des Matériaux (EA 2336)

LISMMA laboratory addresses scientific issues inherent to the complexity of systems, their materials and their life cycles. In order to achieve this objective, modelling, simulation and experimental activities are jointly carried out by 3 research teams:

- Numerical engineering
- Tribology and materials
- Vibroacoustics and structure

LISMMA laboratory is a member of the PhD school of *École Centrale Paris*. Our teacher-researchers participate in the training of Supméca, ECP and ENSTA master students, by providing advanced knowledge in their scientific fields.

Teacher-researchers and technical staff are closely involved in collaborative projects (ANR, FUI, European Community...) with academic laboratories (Supélec, École Centrale Paris, UTC, ENSEA...), research organisations (CNRS, CEA, IFPEN...), competitiveness clusters (AsTECH, Mov'eo, System@tic, Mer Paca, Pegase...) and industrial partners (Dassault Systèmes, EADS, Thales, Safran, Renault, PSA, Valeo...).

LISMMA laboratory organises international scientific conferences (MOSIM, REM, Mecatronics...) and has established scientific partnerships with researchers from many countries.

## A few examples of research and large-scale projects

- Védécom Institute (IEED), located in Satory.
- SystemX institute (IRT, Ingénierie numérique des systèmes du futur), Palaiseau.
- Aigle and Eurocampus project (AsTECH, EADS), located in Le Bourget.
- FUI projects: MEKINOX, MAIAS, O2M.
- ANR projects: IDCYCLUM, MicMacGrains, MIMIC.
- EC projects: MODRIO, In Space Propulsion.
- ADEME projects: EcoSD.

## Numerical Engineering

Research activities address the virtual prototyping of the product, its simulation and manufacturing processes, the management of its life cycle data and informations. Thus, researchers develop new languages, tools and methodologies for:

- ▶ Declarative modelling of geometric systems
- ▶ Engineering of complex mechatronic systems
- ▶ Eco-design and optimisation of products
- ▶ Design and optimisation of industrial systems
- ▶ Modelling and engineering of industrial systems

### Key words

Numerical engineering, system engineering, modelling, simulation, computer-assisted design (CAD), geometric product specifications (GPS), mechatronics, product lifecycle management (PLM), information systems, eco-design, optimisation.

**The support teams work on the technical aspects** in order to carry out research activities, teaching assignments and knowledge management. They are key partners for the teacher-researcher and PhD students.

## Tribology & Materials

Research activities are carried out with the goal of maximizing energy efficiency :

- Friction reduction
- Materials wear reduction
- Materials characteristics optimisations

They combine experimental activities using original test facilities and theoretical developments in modelling and simulation for:

- ▶ Fretting fatigue
- ▶ Microgeometry and contact
- ▶ Thermomechanical behaviour of materials

### Key words

Tribology, fatigue, fretting, roughness, mixed lubrication, hydrogen embrittlement, welding, crash-test.

**LISMMA receives support from 5 technical teams:**

- Calculations
- Instrumentation
- Materials
- Mechanics
- Computer Aided Publishing

## Vibroacoustics & Structure

Research work deals with the vibratory and acoustic analysis of mechanical systems and the passive or active materials that form part of such systems. Supported by experimentation, activities are undertaken for the purpose of reducing vibrations and noise :

- ▶ Damping of structural vibrations
- ▶ Insulation or acoustic absorption materials
- ▶ Structural dynamics

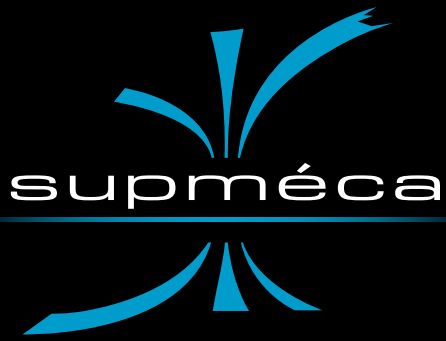
### Key words

Vibration control, damping, acoustic insulation, non-linear vibrations, instabilities, composite materials, active materials, damaging effects.

**Research support:**

- Development and driving of experimental facilities;
- Software and modeling developments;
- Assistance to researchers and PhD students;
- Management of LISMMA investments and experimental resources;

## Support platforms



Research group of the Ministry of Higher Education and Research (EA2336)

The LISMMA is a key research partner for the PRES *Collegium Île-de-France* with ENSEA and EISTI.

**Laboratory Staff:**

- 45 teacher-researchers;
- 45 PhD students and post-doctoral researchers;
- 12 engineers and technicians
- 4 administrative staff members

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