Fluid-structure interactions

ECTS credits
2 credits

In brief

Course langage: French

Presentation

Learning objectives

* Acquire the knowledge necessary to identify situations that could potentially generate fluid-structure couplings and be in a position to propose palliative solutions when possible
* To know the main modes of coupling
* Know how to model, analyze and dimension a problem where a simple fluid-structure coupling occurs
* Know how to interpret experiments involving fluid-structure couplings

Description of the programme

* Examples of fluid-structure couplings in the fields of civil engineering, aeronautics, space and energy
* Reminder of fluid mechanics and elastodynamics
* Dimensional analysis of fluid-structure couplings
* Classification of fluid-structure interaction problems
* Structure immersed in a fluid at rest - added mass
* Aeroelasticity (aeroelastic coefficients and applications in aeronautics and civil engineering)
* Ballooning of fluids in tanks (Tuned Liquid Damper, POGO effect)
* Deformable pipes (applications in biomechanics and hydraulics)
* Introduction to the numerical study of fluid-structure couplings

Generic central skills and knowledge targeted in the discipline

* Know how to model and analyze fluid-structure couplings (C2)
* Master the associated dimensioning methods (C2)

* Be able to calculate aerodynamic forces on structures (C2)
* Interpret experimental results (C2)

How knowledge is tested

Practical work: restitution of reports, 50%.

Project: report restitution, 50%.

Bibliography

E.H. Dowell, A modern course in aeroelasticity, Kluwer acad. publisher, 2004

1. Carmona, et J.-C. Foucriat, Comportement au vent des ponts, Presses des ponts et chaussées, 2002.
2. de Langre, Fluides et solides, Éditions de l'école polytechnique, 2001.
3. Païdoussis, Fluid-structure interactions, T1&2, Elsevier, 2004.

Teaching team

Olivier Boiron (ECM)

Kevin LE PRIN, Project and R&D engineer, SEAL Engineering

Sylvain TRUCHE, Project and R&D engineer, SEAL Engineering

Sustainable Development Goal

Building Resilient Infrastructure

Sustainable cities and communities

Total des heures		**24h**
CM	Master class	12h
TP	Practical work	12h

Useful info

Name responsible for EU

Lead Instructor

Olivier Boiron

olivier.boiron@centrale-med.fr