



ACOUSTIQUE ET ONDES DANS LES FLUIDES

ACOUSTICS AND WAVES IN FLUIDS

Lecturers: **Didier DRAGNA, Gilles ROBERT**

| Lecturers : 20.0 | TC : 24.0 | PW : 4.0 | Autonomy : 0.0 | Study : 0.0 | Project : 0.0 | Language : FR

Objectives

Many types of waves propagate in fluids. Among them, acoustic waves play a particular role in everyday life. They allow for human communication and are the support of music. The course is made of two parts. The first part aims at giving basic knowledge in acoustics. The second part extends the study to other types of waves in fluids (surface and internal gravity waves). It aims at understanding the phenomena of dispersion and propagation in inhomogeneous media.

Keywords : Acoustics, Sound, Noise, Waves, Dispersion relation, Phase and group velocities.

Programme

Elements of formalization and resolution of an acoustic problem (wave equation, boundary conditions, Green's function, ...).

Characterization of acoustic fields (near and far fields, compact source, directivity, structure radiation).

Waves in fluids: notion of dispersion, group and phase velocities through the example of surface gravity waves.

Propagation in inhomogeneous medium and geometric approximation.

Learning outcomes

- Basic calculations in acoustics (sound pressure levels, source power, dB, ...)
- Knowledge of elementary sources (plane and spherical)
- Know the basics about the dB scale, the characterization of noise pollution and its perception
- Master the general techniques to analyse linear propagation of waves in fluids: dispersion relation, high-frequency approximation

Independent study

Objectifs : Analysis and design of a muffler.

Méthodes : TD is partly done in autonomy from a framing sheet and a resource teacher. In the case study, the students analyze the problem in order to formalize the specifications, to propose a solution and finally to discuss possible improvements.

Core texts

S. Temkin, *ELEMENTS OF ACOUSTICS*, John Wiley & Sons, 1981

J. Lighthill *WAVES IN FLUIDS*, Cambridge University Press, 1978

M. J. Crocker et al. *HANDBOOK OF ACOUSTICS*, John Wiley & Sons, 1998

Assessment

Final mark = 0.6*Knowledge + 0.4*Know-how

Knowledge = final exam

Know-how = continuous assessment