

MASTER PHYSIQUE

PARCOURS PHYSIQUE OCÉAN ET CLIMAT

semestre 8 Physique POC

Fluides 2

Présentation

In this course students will learn to identify the physical processes involved in a perturbed fluid system, and to analyse and describe stable and unstable responses. The course is taught in English.

Objectifs

On completing this course, students will be able to identify the physical processes at play in a fluid subject to a perturbation, to express these processes mathematically, and to solve the system. Students will be able to both analyse mathematically and reason physically about the evolution of the system.

Pré-requis nécessaires

An introductory course in fluid dynamics, (vector) calculus

Compétences visées

Applying theory, analytical and numerical methods to analyze the behavior of a perturbed fluid system

Descriptif

Waves

- > Fundamental ideas (kinematics, propagation, wavegroup properties, ray theory) and methods of analysis
- > Applications : surface gravity waves, acoustic waves

Instabilities

- > Fundamental ideas (introduction to hydrodynamic stability and unstable growth, relevant characteristic numbers) and methods of analysis (linear stability analysis)
- > Applications : Kelvin-Helmholtz instability, parallel shear instability, Rayleigh-Bénard convection

Chaotic behaviour

- > Introduction to chaotic systems and sensitive dependence on initial conditions ; the transition to turbulence
- > Applications : Rayleigh-Bénard convection

Classes comprise a mix of mathematical derivation and discussion of the underlying physical processes. Students develop skills in applying the appropriate methods of analysis during problem classes. Accompanying practical work supports each of the three main sections, and allows students to apply the methods to real data.

Modalités de contrôle des connaissances

Session 1 ou session unique - Contrôle de connaissances

Nature de l'enseignement	Modalité	Nature	Durée (min.)	Coefficient	Remarques
	CT	Ecrit - devoir surveillé	180	50%	
	CC	Autre nature		50%	

Session 2 : Contrôle de connaissances

Nature de l'enseignement	Modalité	Nature	Durée (min.)	Coefficient	Remarques
	CT	Oral	45	100%	