

UE Complex fluids



Niveau d'étude
Bac +5



ECTS
3 crédits



Composante
UFR PhITEM
(physique,
ingénierie, terre,
environnement,
mécanique)



Période de
l'année
Automne (sept.
à dec./janv.)

- > **Langue(s) d'enseignement:** Anglais
- > **Ouvert aux étudiants en échange:** Oui
- > **Code d'export Apogée:** PAX9NFAE

Présentation

Description

Goal

Complex fluids are mixtures of different materials and fluids. Usually, we consider the coexistence between two phases: solid–liquid (like suspensions or solutions of polymers, proteins or DNA), solid–gas (like granular materials), liquid–gas (like foams) or liquid–liquid (like emulsions). Complex fluids exhibit unusual mechanical responses to applied stress or deformation. The mechanical response includes non-linear behaviors such as shear thinning or shear thickening as well as large fluctuations (elastic turbulence). The mechanical properties of complex fluids can be attributed to characteristics such as polymer unfolding, caging, or clustering on multiple length scales. The course deals mainly with two kinds of complex fluids: polymer fluids and suspensions.

Content:

1. Introduction to Complex fluids in nature and in industry
 2. Conservation laws. Matter, Momentum and Energy
 3. Standard flows (Poiseuille flow, Couette flow).
 4. Dissipation
 5. Polymer fluids
- Non-linear fluids and shear dependent viscosity
 - Normal stresses and Weissenberg experiment

- From nano to macro: starting from a polymer chain to macroscopic properties
6. Suspensions

- Rheology
- Homogenization
- Taylor dispersion
- Active suspension (natural and artificial nano and micro-swimmers)

Heures d'enseignement

UE Complex fluids - CMTD

Cours magistral - Travaux dirigés

22,5h

Pré-requis recommandés

Basis in hydrodynamics

Période : Semestre 9

Bibliographie

Dynamics of polymeric liquids, B. Bird, vol 1 & 2, John Wiley & Sons Ed. 1987

The structure and Rheology of Complex Fluids, Ronald Larson, Oxford Univ. Press, 1999

Infos pratiques

Campus

› Grenoble - Domaine universitaire