

Modeling and design of multiphase systems and reactors

Titulaires

Pierre COLINET (Coordonnateur) et Senthil PARIMALANATHAN

Mnémonique du cours

CHIM-H402

Crédits ECTS

6 crédits

Langue(s) d'enseignement

Anglais

Période du cours

Deuxième quadrimestre

Contenu du cours

Phenomenology of multiphase systems; Basic hydrodynamic instabilities in systems with interfaces; Basic equations and boundary conditions for describing transport phenomena in systems involving deformable interfaces between different (liquid, gas or solid) phases; Description of phase change processes (evaporation/condensation, solidification/melting); Basic bifurcation theory; Linear stability analysis

Objectifs (et/ou acquis d'apprentissages spécifiques)

The objectives of the first part of the course (P. Colinet) are: i) to get acquainted with the rich phenomenology of multiphase systems, with a view to major fundamental questions and applications; ii) to learn/review basic equations and boundary conditions describing transport phenomena in multiphase systems with interfaces; iii) to solve these systems of equations in practical cases : droplets, bubbles and thin films with heat transfer, evaporation, solidification, ...

Méthodes d'enseignement et activités d'apprentissages

Cours théoriques, exercices, et "laboratoires numériques" (utilisation de codes numériques, p.ex. COMSOL multiphysics)

Contribution au profil d'enseignement

This teaching unit contributes to the following competences:

- > In-depth knowledge and understanding of exact sciences with the specificity of their application to engineering
- > In-depth knowledge and understanding of integrated structural design methods in the framework of a global design strategy
- > In-depth knowledge and understanding of the advanced methods and theories to schematize and model complex problems or processes
- > Reformulate complex engineering problems in order to solve them (simplifying assumptions, reducing complexity)
- > A creative, problem-solving, result-driven and evidence-based attitude, aiming at innovation and applicability in industry and society
- > The flexibility and adaptability to work in an international and/or intercultural context

Références, bibliographie et lectures recommandées

R.B. Bird, W.E. Stewart and E.N. Lightfoot, Transport Phenomena, Wiley, Singapore, 1960.

G. Nicolis, Introduction to Nonlinear Science, Cambridge University Press, Cambridge, 1995.

Autres renseignements

Contact(s)

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Programmes

Programmes proposant ce cours à l'école polytechnique de Bruxelles

MA-IRMA | Master : ingénieur civil en chimie et science des matériaux | finalité Spécialisée/bloc 1