PEES9AF BEHAVIOUR OF DISPERSED PHASES

PEES9AF Behaviour of dispersed phases	Duration : 21 hours	ECTS Credits : 2.5	Semester : S9

Person(s) in charge :

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Keywords : Behaviour of dispersed phases

Prerequisites : None

Objective:

Programm:

Industrial and household effluent treatment (liquid and gaseous) almost always operates in multiphase media, and separation efficiency is measured not only by the mass yield, but also by size and composition (examples: wastewater treatment by flotation, dust, radioactively contaminated effluents).

This course aims to teach students the fundamental knowledge needed to deal with this difficult subject, with an analysis that goes from the microscopic scale to the macroscopic scale. During practical work and tutorials, students will apply the knowledge they have acquired, in particular by taking examples from environmental issues and analysing them with computer software.

Content:

- Shapes of particles and boundary conditions for flow
  Practical work:
  - Shape and trajectory of an isolated bubble according to its size
  - Flow regimes in a bubble column, estimation of exchange surfaces
- Particle interactions – continuous phase
  Analysis of the forces acting on the motion of a particle.
  Description and expression of all the forces.
  Example of the behaviour of a particle in a vortex.
- Modelling the discrete phase
  Lagrangien calculation of a particle's trajectory in laminar, algorithm and numerical method
  Tutorial on Fluent: simulation of solid particle flow in a wind tunnel (vertical)
- Modelling of the discrete phase in a turbulent regime
  Behaviour of a particle in a turbulent flow and Lagrangian calculation of the trajectory
- Population balance (PB)
  General PB equation. A small revision of the distribution functions.
  Transport equation for growth without agglomeration

Tutorial: Size distribution of crystals in a continuous crystallizer
Population balance with agglomeration. (Smoluchowski equation)
Methods for solving PB equations (Hounslow, Ramakrishna, parents and daughter)
Description of agglomeration kernel, in a turbulent regime.

Tutorial: example of an application on computer – Treating dust
Explanation of the combination: Fluid mechanics – Population balance

Tutorial: example of an application on computer – Follow-up and end

Abilities :

Levels	Description and operational vocabulary
Know	
Understand	
Apply	
Analyse	
Summarise	

Assess	

Evaluation :

☑ Written test	☑ Continuous Control	☐ Oral Report	☐ Project	☑ Written Report