

Two-phase combustion

Course code: APC3

ECTS Credits: 1.5

Department	: ET	Lectures	: 15h00
Lecturers	: Z.Bouali	Tutorials	:
Year of study	: 2 nd year	Laboratory sessions	:
Semester	: 3 rd semester	Project	:
Assessment method(s)	: 1 written test	Home works	:
Language of instruction	: English	Total hours	: 15h00
Type of courses	: Compulsory		

Objective: providing the student with physical and phenomenological bases that will enable them to deal with practical applications related to propulsive systems

Prerequisites: Basics of combustion and fluid mechanics

Content:

- Basic of two-phase flows thermodynamics
- Phenomenological description of vaporization processes
- Heat and mass transfer in two-phase flows (isolated droplet)
- Determination of the vaporization rate (liquid droplet and liquid sheet)
- Locally homogeneous flows and separated flows models
- Combustion of sprays and spray combustion diagrams (Chiu, Borghi)
- Preferential segregation effects
- Mixture fraction formalism, derivation of the transport equations for the average and variance of the mixture fraction field
- Two-phase flows turbulent combustion modelling (SDM, MIL)

Recommended reading:

- R. Borghi and M. Destriau, *La combustion et les flammes*, Technip, 1997
R. Borghi and M. Champion, *Modélisation et théorie des flammes*, Technip, 2000
K.K. Kuo, *Principles of combustion*, Wiley, 1986
K.K. Kuo, R. Acharya, *Fundamentals of turbulent and multiphase combustion*, Wiley, 2012
M. Lackner, F. Winter, A.K. Agarwal, *Handbook of combustion*, Vol. 1, Wiley, 2010
C.K. Law, *Combustion physics*, Cambridge University Press, 2010
F.A. Williams, *Combustion theory*, Benjamin Cummins (Menlo Park), 1985

