

Radiation in semi-transparent environment

Course code: ART3

ECTS Credits: 2

Department	: ET	Lectures	: 12h30
Lecturers	: D. Lemonnier	Tutorials	: 12h30
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	: 25h00
Type of courses	: Compulsory		

Objective: Understanding of radiative heat transfer in semi-transparent media (physics, energy balance, equations, principle of temperature field calculation).

Prerequisites: Basic laws for radiative heat transfer (Planck, Wien, Stefan, thermo optical properties of surfaces, view factors, balance equations).

Content:

- Radiative heat transfer with multireflections,
- Introduction to physics and modelling of semi transparent media (absorption, emission, energy balance, examples of materials and industrial domains of interest),
- Intensity equation and energy equation; optically thin and optically thick media (Rosseland approximation),
- Hottel diagrams,
- Heat flux exchanged in the case of a gray semi transparent medium (mean hemispherical beam, couplings evaluation, multi reflections),
- Basic laws of atomic and molecular physics for gas radiation analysis,
- Lines shapes (broadening, intensity),
- Models of emission spectrum,
- Principle of temperature field calculation.

Recommended reading: Hottel et Sarofim (1967), Siegel et Howell (1981); Modest (1983); Brewster (1992)

