THERMIQUE ET COMBUSTION

THERMICS AND COMBUSTION

Lecturers: Mathieu CREYSSELS, Andrea MAFFIOLI, Mikhail GOROKHOVSKI

| Lecturers : 20.0 | TC : 18.0 | PW : 10.0 | Autonomy : 0.0 | Study : 0.0 | Project : 0.0 | Language : FR

Objectives

Describe and quantify energy transfer phenomena, in particular heat transfer, which are essential both for energy production (turbines, engines, turbojets) and for limiting energy consumption for more sustainable development (more efficient engines and low energy or positive energy buildings). The course provides essential knowledge and skills for industrial or environmental applications involving thermal phenomena such as: energy exchange in a quiet environment, fires, explosions, burners, engines or jet engines.

Keywords : Energy, heat transfer, convection, radiation, heat exchangers, combustion, flames, engines, more sustainable development

Programme

Heat transfer :
1) Description of heat transfer modes (conduction / natural, forced and mixed convection / radiation)
2) Formulation of the coupled dynamic and thermal equations.
3) Heat transfer coefficients and dimensionless numbers.
3) Conductive heat transfer in stationary and non-stationary regime.
4) Forced convection in laminar and turbulent regime.
5) Heat exchangers. Calculation of thermal efficiencies.

Learning outcomes

- Know the different modes of heat transfer (conduction, convection, radiation).
- Describe the phenomenon of combustion and the physics of flames.
- Know how to estimate and calculate heat transfer numerically (using Matlab or Python tools).
- Use the Fluent simulation tool to numerically model a heat transfer flow.

Independent study

Objectifs : This activity is not concerned with framed autonomy activities outside personal work.

Méhodes : This activity is not concerned with framed autonomy activities outside personal work.

Core texts

Jean Taine, Franck Enguehard, Estelle Iacona, *TRANSFERTS THERMIQUES*, Dunod, 2021
Theodore L. Bergman, Adrienne S. Lavine, Frank P. Incropera, David P. DeWitt *FUNDAMENTALS OF HEAT AND MASS TRANSFER*, Wiley, 2019
Irvin Glassman, Richard A. Yetter, Nick G. Glumac*COMBUSTION*, Elsevier, 2014

Assessment

Final mark = 50 % Knowledge + 50 % Know-how
Knowledge mark = 100 % final exam
Know-how mark = 100 % continuous assessment