

APPLIED THERMAL FLUID DYNAMICS – 9 CFU LM

Baldinelli (72 ore)

Conduction

Thermophysical properties; Fourier equation; application of steady-state conduction; nonlinear problems; fins; non-stationary cases; approximation of the thin object; transient in non-uniform temperature systems; transient conduction in buildings envelope; transfer matrix.

Convection

Navier-Stokes equations, energy equation in fluids; mechanical and thermal boundary layers: governing equations; thermal effects of turbulence; forced convection: velocity and temperature profiles; flat plates; external flow on cylindrical surfaces; internal flows inside pipes; natural convection.

Radiation

Fundamental quantities; Kirchhoff's law; black and grey surfaces; view factors.

Boiling and Condensation

Pool boiling; Nukiyama curves; nucleate boiling; external forced convection boiling; condensation; correlations for film condensation on vertical plates.

Heat Exchangers

Classification; method of the logarithmic mean temperature difference; method of the efficiency.

Mathematical Models for the Evaluation of Pollutants Dispersion into the Atmosphere

Classes of atmospheric stability; vertical temperature gradients; Gaussian models.

Computational Thermal Fluid Dynamics

Finite differences method, finite elements method in steady-state and non-stationary conduction; Applications for other heat exchange mechanisms and case studies.