
Applied thermal fluid dynamics B

Finalità

The course is aimed to the practical application of theoretical concepts already learned in the previous courses of Technical Physics and Applied Thermal and Fluid Dynamics A. The topic is focused on heat and mass transfer phenomena, and the application is referred specifically to mechanical industry applied to the productions of food and beverages.

Programma

Design and numerical computation of devices for heat transfer and for heat treatment of food.

Design techniques for steam generators, concentrators, dryers, pasteurizations, recovery heat exchangers, etc.

Experimental techniques applied in the lab, on pilot systems and on real production units: practical measurements of temperature, power, fluid flow, pressure losses. Mechanical and electronic measurement devices: thermometers, manometers, flow meters, level meters, data acquisition and processing systems.

Process control based on thermal and flow measurements, basics of digital control equipment and algorithms.

Thermal and fluid flow transients: analytical and numerical models.

Development of a numerical code for the simulation of thermal transients based on the finite differences method, employing a visual programming language.

Infrared thermograph: from a purely qualitative tool to a precise instrument for the analysis of thermal phenomena and transients.

Attività d'esercitazione

The students will make some experience of thermal and flow measurements in the lab, both in the CEDI mechanical lab and in the IED thermal sciences lab (building n. 5). The students will also spend some hours in the CEDI information technology lab, when developing their software.

Modalità d'esame

Oral examination, plus 1 to 5 points assigned to the students who developed a working software for the thermal transient analysis.

Propedeuticità

Applied Thermal and Fluid Dynamics A

Testi consigliati

F. KREITH: "Principi di trasmissione del calore" - Liguori Editore, Napoli, 1976

F. P. INCOPRERA, D P DE WITT: " Fundamentals of Heat and Mass Trasfer ", John Wiley & Sons, New york, 1985.