
Macchine elettriche e azionamenti elettrici

Finalità

The course provides the basic knowledge required for the usage of the most common electrical machine and electric drives.

Programma

Electric machines classification. The main components of the electric machines.

Joule losses and iron losses: the efficiency of the electrical machines.

Transformer: ideal transformer and real transformer: no load operations and rated load operations.

Voltage drop, power, losses and efficiency of electrical transformer. Three phases transformers.

Induction machines: mechanical and electrical behaviour. Induction motor start-up and velocity regulation.

Direct Current machines: electrical and mechanical behaviour, start-up and velocity regulation.

Permanet Magnet Synchronous Machines (PMSM): a.c. and d.c. PMSM, electrical and mechanical behaviour.

Permanet magnet step motor, reluctance step motor and hybrid step motor.

Electric Drives classification. The main components of electric drives: speed and position transducers, current transducers.

Analog and digital PID regulators, PLC.

Electric drives based on permanent dc motors: torque control and velocity control.

DC motor supply: soft switching chopper.

Electric drives based on PMSM: torque control and velocity control.

Electric drives based on induction motors: torque and speed control.

Incremental electrical drives: basic stepping motor control circuits.

Attività d'esercitazione

Laboratory activity on electrical machines characterization.

Modalità d'esame

The exam is based on an oral discussion

Propedeuticità

Applicazioni Industriali Elettriche

Elettronica

Testi consigliati

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Lecture notes