



**University of Pavia**

**Ph.D. School of Electrical and Electronics Engineering and Computer Science**

## **SEMINARS**

### **Design of medium-sized and large synchronous machines: guidelines to select the main features, basic calculation tools, practical examples**

***Eng. Pietro Sforzini***  
***former Project Manager at Alstom***

8 May 2018, h 14:00÷16:00, room “Aula 5”

9 May 2018, h 14:00÷16:00, room “E3”

Polo Didattico Ingegneria, Via Ferrata 5, Pavia

**Abstract:** The seminars will be focused on insights related to synchronous generators of medium and high power, employed in thermoelectric and hydroelectric energy production. First of all, an overview of various types of synchronous machines currently in operation or under construction will be shown. Then, the general criteria and sizing formulas will be presented, including utilization factor (Esson's constant), limits imposed to the main dimensions and flywheel effect. Afterwards, the electromagnetic design of the rotor will be addressed, both for isotropic and anisotropic machines, with particular reference to the field waveform: main characteristic parameters, examples of calculation with the aid of Finite Element programs. Similarly, the electromagnetic design of the stator will be discussed: selection of the slots number, windings with integer and fractional number of slots per pole and phase, winding factor, induced electromotive forces, harmonic distortion (calculation procedure, examples for different types of machines). Finally, the design of a salient pole generator will be presented: calculation procedure and formulas, some examples.

**Bio:** Pietro Sforzini obtained his MSc degree in Electrical Engineering at the University of Pavia in 1977. He joined Ercole Marelli in 1978: this firm changed his property in ABB (1988) and, subsequently, in ALSTOM (2000), where he has been working until the retirement (April 2015). His main fields of activity have been the following: design of synchronous generators, in particular turbo-generators, as specialist in electromagnetic and thermal calculation (1978-90); responsible of Manufacturing Engineering (1990-96); project management and sales (1996-99); customer service for the Generator Engineering Dept. (1999-2015). He collaborated with Politecnico di Milano for some exercises in 1982 and with University of Pavia, since 1984 until today, for exercises, seminars, lessons and theses. He published some papers on specialized journals.

**Organizer**

Dr. Lucia Frosini

**Ph.D. Coordinator**

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