

**DIPARTIMENTO DI INGEGNERIA
CORSO DI DOTTORATO IN INGEGNERIA INDUSTRIALE E
DELL'INFORMAZIONE -
PHD COURSE IN INDUSTRIAL AND INFORMATION ENGINEERING -
34TH CYCLE**

Title of the research activity:	Modelling, simulation, and experimental characterization of magnetic materials and components in avionics and industrial applications.
State of the Art:	<p>Several industrial and avionics applications deal with magnetic components, such as, inductors, transformers, motors, power supplies, wireless power transfer systems, etc.</p> <p>The behavior of these components and systems is non linear, sometimes exhibits memory effects, and it is strongly dependent on the magnetic materials used: laminated electrical steels, ferrites, etc.</p> <p>It is therefore necessary to have at disposal effective and accurate models of such materials, either in transient, or in non sinusoidal steady-state, in order to properly design the devices to increase their efficiency.</p> <p>Typical frequency range is from few kHz to several MHz.</p> <p>The experimental characterization of the models must be done using suitable frames, such as Epstein, Disk Testers, Domain Viewers, and the waveform control is essential.</p>
Short description and objectives of the research activity:	<p>The research activity will be based on the following tasks:</p> <ul style="list-style-type: none"> - Experimental characterization of innovative magnetic materials; - Engineering modelling of the non linear and hysteretic magnetic behavior of the materials, of the magnetic cores and of the devices; - Non invasive and non destructive magnetic testing; - Estimation of magnetic dynamic power losses; - Estimation of the produced waveforms; - Application to the design of magnetic components used in power electronics applications.
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