High Bandwidth hysteresisgraph for characterization of 1D and 2D iron losses in soft magnetic materials

About IRT

Institute for Technological Research (IRT) Saint-Exupéry is part of the IRT Initiative launched in France to boost high value competitive technological sectors.

IRT Saint-Exupéry is an interdisciplinary thematic institute that develops economic sectors related to aerospace and embedded systems through a balanced strategic public-private partnership. For this, it manages research programs coupled with technology platforms, conducts research and development projects at international level; contributes to the engineering of initial and continuous trainings (qualifying professional training and/ or degree delivering); and ensures the exploitation of the obtained results.

The institute is located in two main French aerospace clusters: Toulouse and Bordeaux. By the end of 2015 IRT Saint-Exupéry had more than 80 researchers coming from Industry (secondment) and public sectors (part time researchers) as well as around 50 Ph.D. and Post-Doctorate fellows.

More Electrical Aircrafts Department

In addition to the departments of Materials and Embedded Systems, IRT Saint-Exupéry host the More Electrical Aircraft Department, which conducts different research projects related to the replacement of hydraulic and pneumatics technologies by electrical ones. The aim is to develop technologies to reduce the weight and volume of every element of the electrical system taking into account all constraints (EMI, reliability, cost,…).

Key Projects and Research Topics

Integration of electromechanical chain

- Iron losses characterization for design of high performance machines and magnetic components
- Characterization of switching losses of wide bandgap semiconductors
- Thermal modelling and optimization of high performance cooling systems for power converters
- Design and fabrication of high performance SiC power modules
- Integration and EMI characterization of high performance electromechanical chain

Circuit for characterization of switching losses of 1200V/100A SiC module

Robustness and reliability

- Characterization and modeling of the effects of ageing on EMC behavior of COTS analog and digital components
- Reliability modelling of microelectronics parts
- Radiation effects modelling on GaN Normally-off technologies
- Characterization of partial discharge and gaseous breakdown in aeronautic environment
- Characterization and standardization of aeronautical testing electric arc

Energy storage systems

- Modelling of aging process of high and low temperature fuel cells and batteries.
- Development of diagnostic tool for maintenance of fuel cells and batteries.

Partial discharge detection in motor stator bobbin