

Electrical Engineering Department

Superconducting Magnetic Energy Storage Systems

UNINOVA – Centre of Technology and Systems



Fundação para a Ciência e a Tecnologia
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Objectives

- Development of methodologies and simulation tools for the application of Superconducting Magnetic Energy Storage (SMES) Systems to mitigate power quality issues in power systems, thus contributing to the advent of sustainable technologies based on superconducting materials and the implementation of Smart Grids.

Methodology

- Conduct a comprehensive literature review on the problems associated with power quality in electric grids and how the superconducting technology can mitigate these problems, with special focus on SMES systems (see Fig. 1).
- Develop models to design SMES systems for power quality applications.
- Implementation of a prototype to perform experimental tests on a microgrid environment.

Expected Results

- Validation of models by collecting data from network simulation software.
- Mitigate power quality problems in a microgrid by the utilization of a small prototype SMES system.
- Define Scaling rules for the creation of a full device to work in real grid environment.

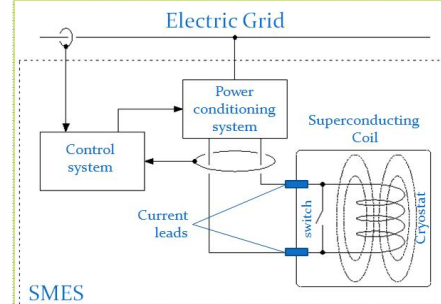


Fig. 1 – Composition of an SMES system

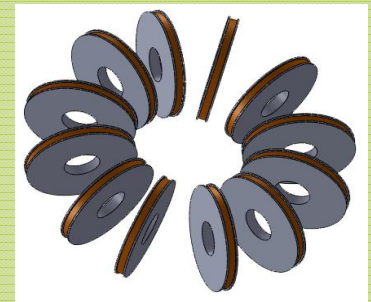


Fig. 2 – Superconducting coils

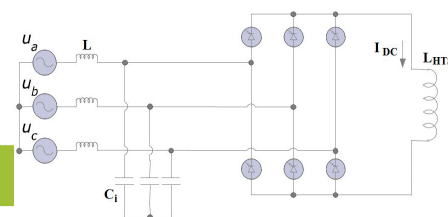


Fig. 3 – Electric connections of an SMES system

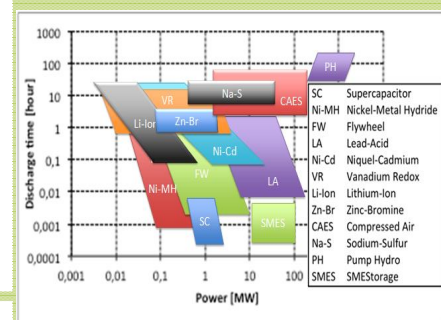


Fig. 4 – SMES and other Energy Storage Systems – A possible comparison