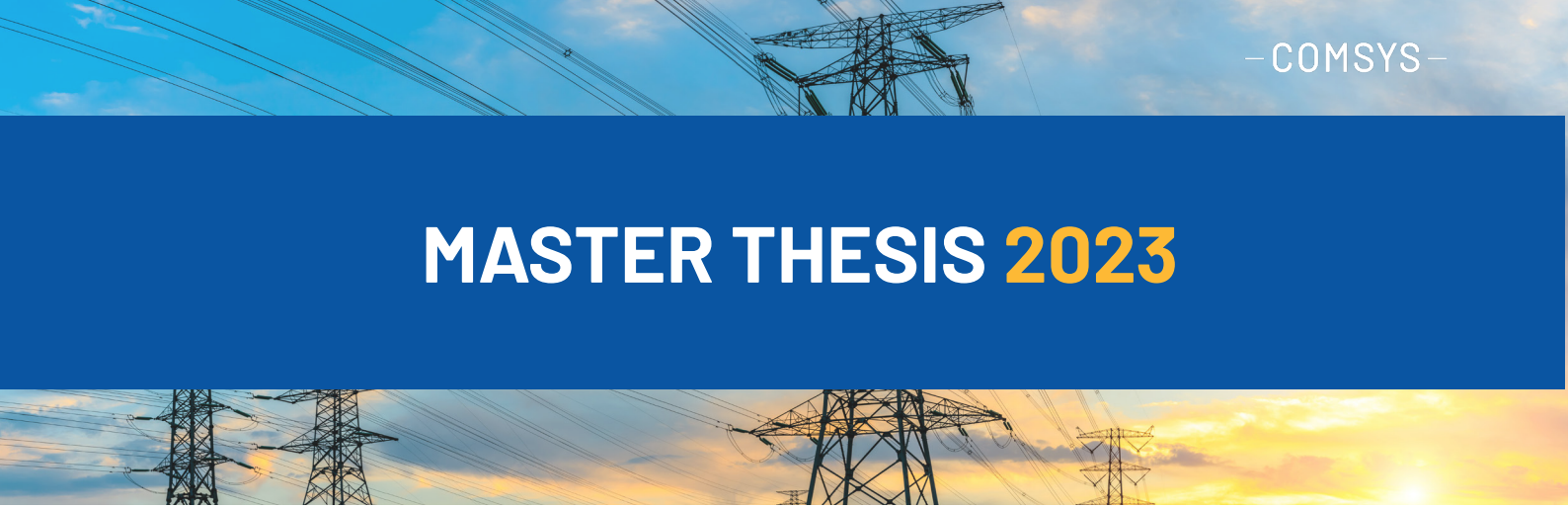

MASTER THESIS 2023

CORELESS INDUCTORS FOR LINE FILTERS

MSc project proposal

ABOUT US

Comsys, a forefront cleantech company, is dedicated to "Perfecting Power." We focus on enhancing power quality across AC and DC supplies. As the world pivots towards renewable energy, ensuring a resilient electric grid has never been more important. Master theses at Comsys play a important role in our research and product development. We offer you a chance to dig into these challenges, combining your passion for the environment with real physical innovations. Join us in shaping the next phase of power efficiency.

BACKGROUND

Grid-connected power converters use line filters to suppress high-frequency current ripple generated in switching. Such line filters are typically based on the LCL circuit configuration and, conventionally, the required inductors are made of coils wound around some magnetic core material. The core material increases the inductance for a given number of winding turns and confines the magnetic flux to the core. However, the core material is both heavy and costly while exhibiting undesirable non-linear behavior.

As an alternative, coreless (air core) inductors are currently being considered, with new demands on component geometry and magnetic screening. This technology is to be studied, simulated and tested.

Conventional Inductors

Coreless Inductors

From Comsys side you will be supported with basic simulation models, lab systems and tools for measurement and comparison of results. You will also have supportive colleagues nearby.The simulations will be performed in Matlab/Simulink and COMSOL Multiphysics.

GOAL

The focus will be a three-phase line filter implemented by coreless inductors.

Rated current: ~50 Arms
Current spectrum: Baseband- 50-2500 Hz (~50 Arms)
Switching frequency- 5 kHz-25 kHz (~10 Arms)
Inductance: ~100 µH

- Compactness versus functionality (magnetic radiation and coupling)?
- Requirements on magnetic screening (added losses, circuit performance)?
- Stray effects as function of geometry; impact on coil resonance frequency?
- Inductor losses as function of geometry and material selection?

TARGET START DATE

VT 24

For more information / APPLY

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