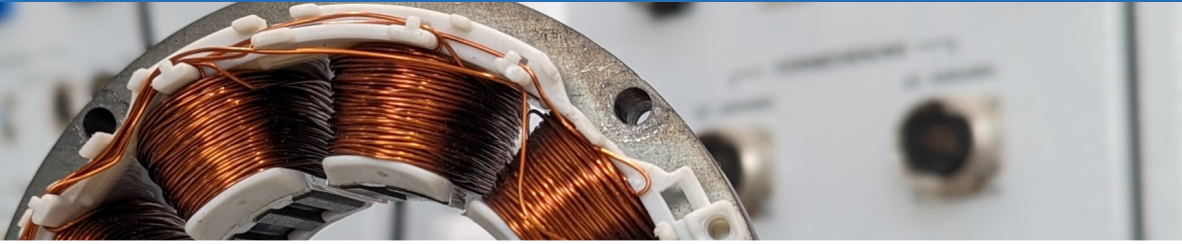


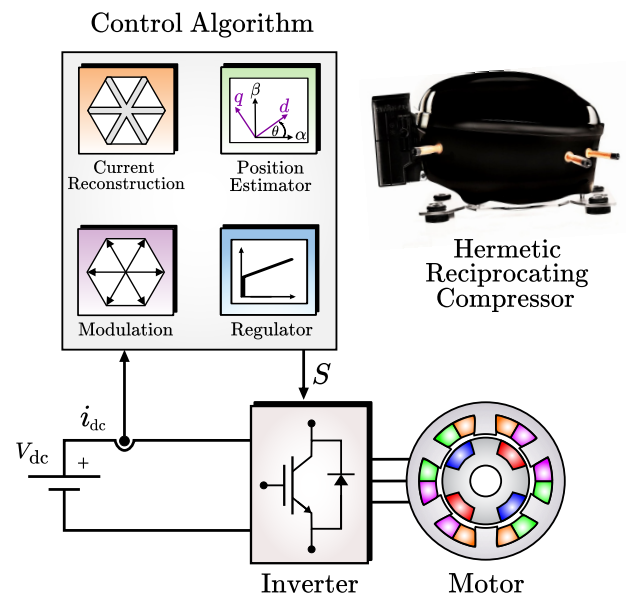
Master's Thesis

Sensorless Control of a Compressors PMSM Drive using a Single DC-Link Shunt Sensor



MOTIVATION



Hermetic reciprocating compressors (HRCs) are vital in household refrigeration systems, where compact, reliable operation is essential. Permanent magnet synchronous motors (PMSMs) are widely used in these systems for their high efficiency and power density. However, the hermetically sealed design prevents the use of mechanical position sensors, requiring sensorless control strategies with observers that estimate rotor speed and position from measured voltages and currents. Cost constraints also limit the system to a single current sensor, making accurate current reconstruction mandatory for complete phase current information. The objective of this thesis is to develop and evaluate observer algorithms and current reconstruction methods to enable effective sensorless speed control based on Field Oriented Control (FOC), ensuring reliable operation for PMSM drives in HRC applications.





RESEARCH TOPICS and TASKS

- Understanding and modelling PMSM drives together with their speed and current control algorithms.
- Evaluate and compare various sensorless control approaches.
- Assess different current reconstruction techniques using a single DC-link current measurement resistor.
- Propose, simulate, and experimentally implement a sensorless control scheme with current reconstruction.
- Detailed project description upon discussion with the candidate.

ORGANISATIONAL MATTERS

-  Start: Immediately
-  Support from the motivated teams of the institute

-  Workplaces and lab-spaces the institute available
-  Writing in German or English possible

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