Offene Arbeit (in English)

TECHNISCHE
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Loss and Thermal Analysis of a Flywheel System

Institut für
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Energiewandlung

Introduction

A flywheel prototype (Fig. 1 a)) was built in the Institute *EW*: A steel rotor with a mass body is driven by a permanent magnet (PM) machine (Fig. 1 b)) up to the maximum speed of 24 000 min^{-1}. The rotor is suspended by magnetic bearings and the system is sealed in vacuum. Losses of this prototype are measured experimentally. They exist in the PM machine (dominant), in the magnetic bearings, as well as on the rotor surface due to the air friction. The aim of this thesis is to validate the loss and thermal model based on the measurements.
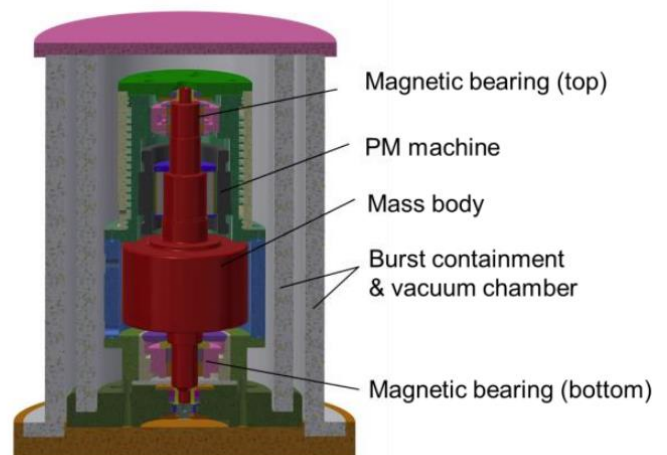
a) Prototype   b) System scheme

Fig.1. Flywheel system, capacity 0.5 kWh, maximum speed 24 000 min^{-1}

The following tasks are expected:

1. Validate and improve the existing loss & thermal model (both analytical and numerical) based on the measured results.
2. Investigate further optimization possibilities to reduce the losses, e.g. optimizing machine design, varying air pressure or structure, etc.

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