Masterarbeit

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Investigation of the stator core material parameters in hydrogenerators

The magnetically-induced vibration in electrical machines is an important topic of interest since undesirable effects can be associated to it, such as possible damages, life span reduction and consequent audible noise. For an accurate prediction of the machine vibration, it is mandatory to employ mechanical models with the actual material parameters of the stator core. In the particular case of hydrogenerators, where the stator is composed of stacked thin laminations grouped in packs and separated by ventilation ducts, taking into account these effects for such a large structure in time-cost effective manner is a real challenge.

The thesis aims at extracting the equivalent material properties based on experiments performed on a prototyped stator core sector. The measured eigenfrequencies are used to calibrate the mechanical model and, consequently, extract the desired material parameters.
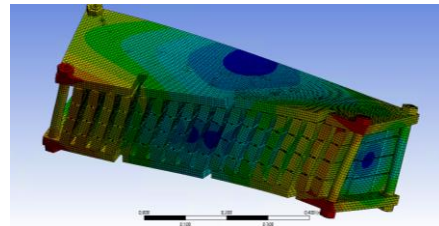

Fig. 1: Stator sector prototype

The main activities are:

- Literature review about vibrations and stator core material parameters.
- Familiarization with FE mechanical modal analysis using Ansys Workbench.
- Creation of a mechanical model in Ansys for the prototyped stator sector.
- Measurements (experimental modal analysis) on the prototype in the laboratory for different clamping pressures and temperatures.
- Application of parameter fitting techniques for the calibration of the calculation models.

Forschungsschwerpunkt:

Elektromobilität / Aviation	☐	Großmaschinen	☒	Antriebe für industrielle Anwendungen	☐
Geräusche und Schwingungen	☒	Hochfrequenzeffekte	☐	Entwurfs- und Berechnungsverfahren	☐

Inhalt:

	viel → wenig						viel → wenig				
Methodenentwicklung	☐	☒	☐	☐	☐	Programmierung	☐	☐	☒	☐	☐
Maschinenentwurf	☐	☐	☐	☐	☒	Praktische Tätigkeit	☒	☐	☐	☐	☐
Finite-Elemente- / Systemsimulation	☒	☐	☐	☐	☐						

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