IEEE Joint IAS/PELS/IES Austrian Chapter

Lecture

Efficient robust optimization of electric machines

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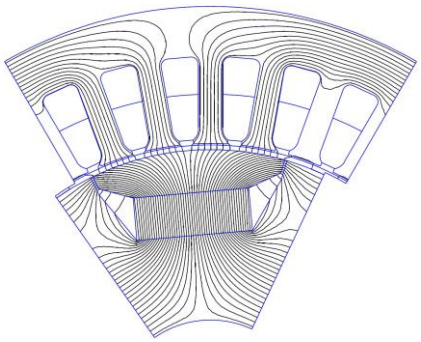
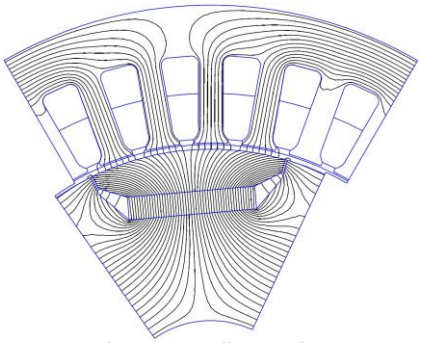
Robust optimization strives to identify optima that are only at minimum influenced by parameter deviations that might occur, e.g., due to manufacturing.



Initial configuration

Optimization first requires the algorithm that will be applied to be chosen:

Algorithms inspired by nature have found wide application. When considering electric machine design, they come at the advantage that the finite element solver can be used as a black box, and that the computations can be carried out in parallel. However, such approach requires a high number of investigated different design configurations, which brings forth a relatively high computational cost. The lecture will address possibilities to reduce this computational burden.



Robust configuration

An alternative to algorithms inspired by nature are gradient-based approaches. These use the notion of local sensitivities. The lecture will discuss how such sensitivities can be calculated cheaply.

The optimization of the shape of the permanent magnets in a permanent magnet synchronous machine is used as example case.

Zeger Bontinck received the M.Sc. degree in astrophysics from the Faculty of Science, Catholic University Leuven, Leuven, Belgium, in 2011. Since 2013, he has been a doctoral candidate at the Faculty of Electrical Engineering and Information Technology**,** Technische Universität Darmstadt, where he is working in the Theorie Elektromagnetischer Felder group, and also as a member of the Graduate School of Computational Engineering. His research interests include numerical methods for modeling of electrical machines and devices, uncertainty quantification and robust optimization.