Master's Thesis

in collaboration with
Institute of Fundamentals and Theory in Electrical Engineering

Global Sensitivity Analysis of Electrical Motors through Polynomial Chaos Expansion Model

Motivation

Optimizing electrical machines is both a challenge and an opportunity to push the boundaries of engineering innovation. The complexity of these systems, with their intricate parameter interactions, demands a deeper understanding to achieve peak performance. **Sensitivity analysis** stands out as a powerful tool, uncovering the most influential factors that shape system behavior. Through this analysis, there is the chance to simplify complex models, improve designs, and contribute to groundbreaking optimization techniques. In the dynamic field of electrical motors—-where mechanical precision meets the demand for efficiency—-sensitivity analysis offers the key to unlocking better performance and driving technological development.

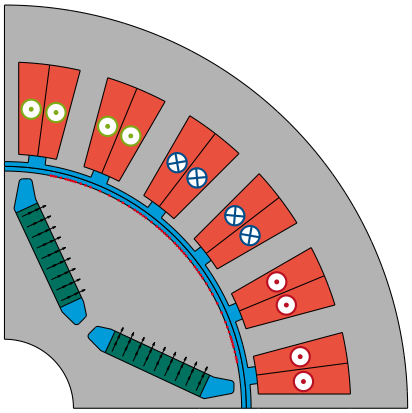
The goal of this project is to analyze the mechanical responses of an electrical motor model by varying key geometrical parameters. We will evaluate different sensitivity analysis methods and select the most appropriate ones to uncover important relationships within the system and understand how these parameters affect the motor's behavior.

Tasks

- Selection of a suitable sensitivity analysis method
- Analysis of the several responses of the motor

Requirements

- Willingness to code - MATLAB
- A mathematical mindset and interest in numerical approaches



Model of the permanent magnet synchronous motor showing the control points highlighted in red.

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