Migration and Development of a High-Performance Simulation Core for Gear Power Loss Modeling

Interdisciplinary Project (IDP)

Technische Universität München
TUM School of Engineering and Design

Institute of Machine Elements
Gear Research Center (FZG)
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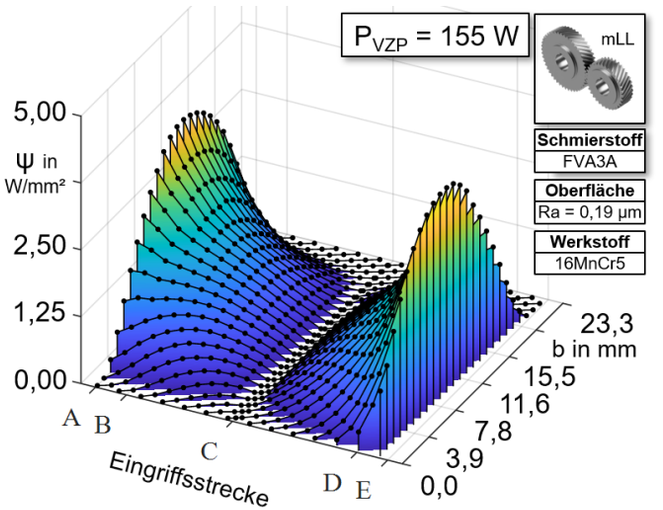
Background:

Accurate prediction of power loss in gear systems is critical for improving the efficiency of modern drivetrains. The current research tool LVplus is used to model local gear mesh losses based on detailed physical and tribological models. However, its implementation is primarily based on MATLAB, which limits scalability, maintainability, and integration with modern software ecosystems. Therefore, a transition towards a modern, high-performance and modular software stack is required. Parts of a new high-performance computational core have already been implemented in Fortran. However, a robust and scalable interface between Python (for orchestration, data handling, and machine learning) and Fortran (for efficient numerical computation) still needs to be developed.

Objective:

The goal of this project is to design and implement a modern software architecture for LVplus by connecting a high-performance Fortran-based simulation core with a Python interface. The aim is to enable seamless integration of physics-based models and future AI components within a scalable and maintainable framework.



Requirements:

- Strong programming skills in Python; basic knowledge of Fortran
- Experience with cross-language interfaces
- Structured and independent working style
- Start: from 01.07.206

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