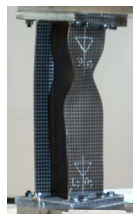
Evolutionary power spectrum estimation of multi-variate random fields for stochastic buckling analysis of imperfect structures

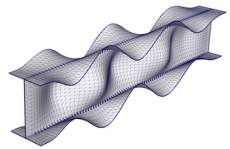
Supervisors: Dominik Schillinger, Nils Zander

Conceptual Modelling

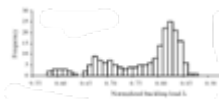


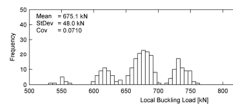
- Stochastic Process Theory
- Physics → Mathematics

Evaluation + Verification



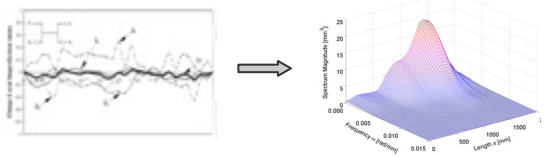
- Simulation of Buckling Phenomena





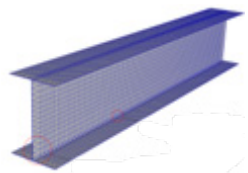
- Stochastic Parameters + Variabilities

Parameter Identification



- Spectrum Estimation for Narrow-Band Evolutionary Random Fields

Numerical Strategy



- Non-linear FEM
- Sampling + Discretization
- Monte-Carlo

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Project outline

- *1. step:* Work into theory (Stochastic process theory, spectral representation, Fourier analysis, method of separation, Monte Carlo methods

- *2. step:* Implement a MatLab program for the estimation of the Kaimal-Davenport benchmark spectrum

- *3. step:* Adjust your MatLab program to simulate random geometric imperfections of an I-section beam

- *4. step:* Determine the corresponding buckling load variability using Nastran