



University of Stuttgart
Germany

Department for Stochastic Simulation
and Safety Research for Hydrosystems (LS³)

Bayesian calibration of rail vehicles model

M.Sc. Topic

The Next Generation Train Project (NGT) bundles research activities in the field of rail vehicles at DLR. In this context, the fatigue design of railway vehicle structures is examined. By considering real operational loads, an optimal vehicle design with respect to weight reduction and safety shall be obtained. The enormous effort of testing shall be reduced by replacing tests with numerical simulations.

In order to guarantee that the simulation reproduces the real system behavior with sufficient precision, the models need to be calibrated and validated from measurement data. However, since test results vary due to uncertainties in applied loads and material parameters, a deterministic calibration giving one optimal parameter set is not appropriate. In order to consider the variability of the real system, the calibration process shall specify a-posterior probability distributions of the parameters, using an initial estimation and the measuring results. This approach is known as Bayesian calibration.

This master thesis aims to perform Bayesian model calibration via a model reduction technique. For this purpose, a relevant component of the car body structure should be selected and modelled in detail. Experiments for the calibration and validation of the model shall be prepared and simulated.

Prospective Tasks

- Familiarization with the fatigue simulation process and the Bayesian calibration
- Planning and simulation of an experimental setup to calibrate the model parameters
- Evaluation and documentation of the results

General Information

- Advisors: Dr. Sönke Kraft (DLR), PD. Dr.-Ing. Sergey Oladyshkin (University of Stuttgart)

Desireable Skills

- Python, computer programming
- Affinity to numerical simulations, statistics and programming (Python)

Apply now!

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