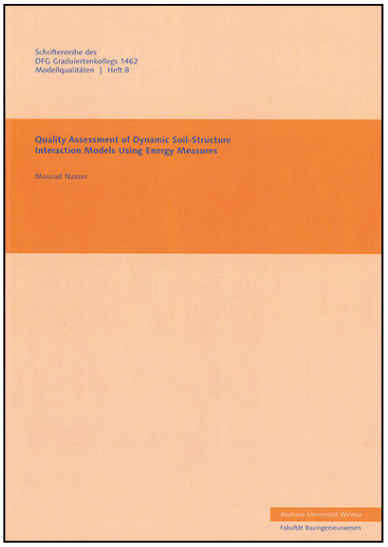
# Quality Assessment of Dynamic Soil-Structure Interaction Models Using Energy Measures

In this research work, an energy approach is employed for assessing quality in dynamic soil-structure interaction (SSI) models, and energy measures are introduced and investigated as general indicators of structural response. Dynamic SSI models with various abstraction levels are then investigated according to different coupling scenarios for soil and structure models. The hypothesis of increasing model uncertainty with decreasing complexity is investigated and a mathematical framework is provided for the treatment of model uncertainty.

This framework is applied to a case study involving alternative models for incorporating dynamic SSI effects. In the evaluation process, energy measures are used within the framework of the adjustment factor approach in order to quantitatively assess the uncertainty associated with SSI models. Two primary types of uncertainty are considered, namely the uncertainty in the model framework and the uncertainty in the model input parameters. Investigations on model framework uncertainty show that the more complex three-dimensional FE model has the best quality of the models investigated, whereas the Wolf SSI model produces the lowest model uncertainty of the simpler models. The fixed-base model produces the highest estimated uncertainty and accordingly the worst quality of all models investigated.

These results confirm the hypothesis of increasing model uncertainty with decreasing complexity only when the assessment is based on the ratio of structural hysteretic energy to input energy as a response indicator.

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