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Experience-Based Model Quality Assessment Methods And Their Application to Reinforced Concrete Walls

Studies focused on models and their associated parameters are of crucial importance to engineers since models are the essential tools for structural analysis and design. Particularly, diversity of the available models has introduced difficulties on the choice of a unique model to define a desired phenomenon. Consequently, model selection techniques have been developed to address the issue. Though, they mainly rely on a benchmark model as the reference to check the other models. The benchmark is usually chosen to be the experimental measurement or the most complex model where no experimental data is accessible. A model selection technique will be proposed which evaluates models quantitatively based on a systematic comparison considering their uncertainty and sensitivity properties. The core assumption is that any model in a group of models to be assessed has the potential to be the best abstraction of the studied phenomenon regardless of its nature (experimental or numerical) or complexity status. The proposed methodology was applied to a series of mathematical and engineering problems including the data collected in the so-called experience-based database on reinforced concrete walls. The straightforward mathematical problems were used as benchmarks whereas the engineering problems were supposed to challenge the capacity of the method in practical situations. In all the studied cases, the assessment results agreed well with the qualitative evaluation of the models.
The proposed model selection technique was founded on the ground of a conceptual implementation of the variance-based sensitivity analysis. Therefore, the conceptual implementation was exclusively investigated to shed some light on the fundamentals of the proposed method.

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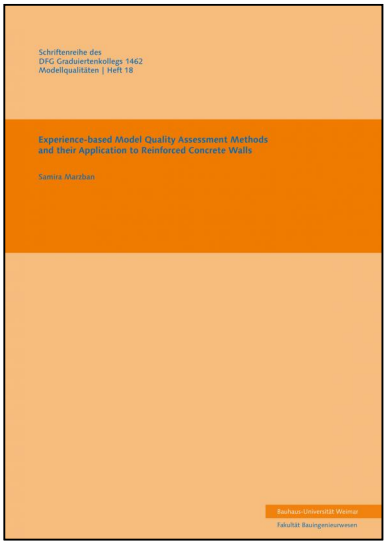

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