

## Data-Model Assimilation for Probabilistic Diagnosis and Prognosis of Structural Deterioration

Dienstag, 10. Oktober 2017

17:00 Uhr

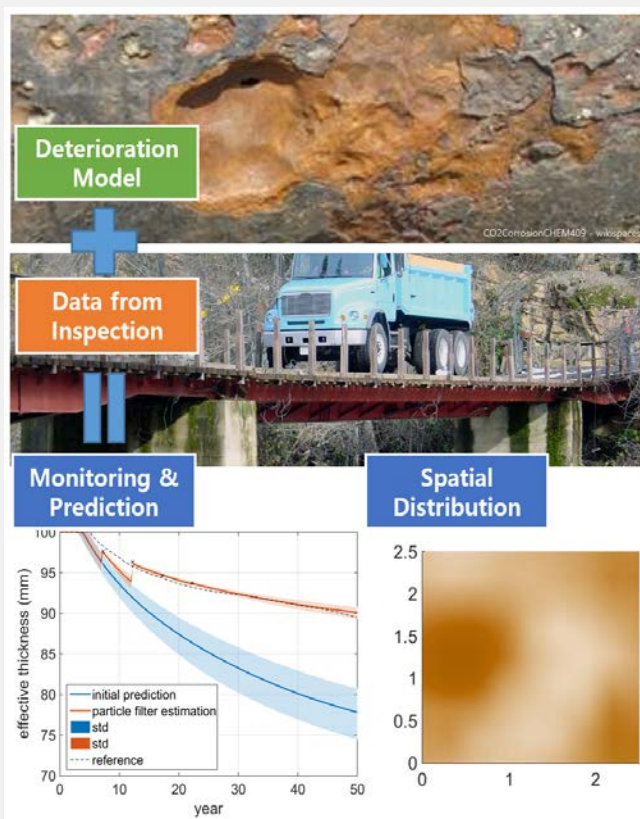
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Spatio-temporal monitoring and prediction of structural deterioration by data-model assimilation

Accurate diagnosis and prognosis of deterioration are essential to ensure operational safety and effective maintenance of structures. Bayesian-filter-based assimilation of measurement data and physical model can facilitate diagnosis and prognosis of the deterioration propagation, as well as calibration of parameters in the deterioration evolution models. Among existing Bayesian filter methodologies, particle filter is considered an effective tool especially for nonlinear models subjected to non-Gaussian uncertainties. This presentation introduces a novel application of the particle filter approach in which direct measurements of deterioration or indirect mechanical, i.e. force-displacement observations are assimilated to infer corrosion progresses. For this purpose, the spatial distribution of deterioration outcome, e.g. thickness of a steel plate, is described by a random field model whose parameters are updated by Markov Chain Monte Carlo (MCMC) sampling given measurement data on loads and displacements. Using a particle filter, various static, time-varying and stochastic model parameters related to deterioration phenomenon are inferred for the purpose of diagnosis and prognosis. The results of numerical examples show good performance in prediction of effective deterioration pattern and identification of model parameters under various scenarios. The proposed approach is expected to promote optimal condition-based maintenance strategies.

Anschliessend an den Vortrag ist ein gemeinsames Nachtessen mit dem Referenten im Restaurant Die Waid, Waidbadstrasse 45, 8037 Zürich vorgesehen.

Nächster Vortrag: Dienstag, 14. November 2017, 17:00 Uhr, HIL E 3

Dr. Antonio Martínez Cutillas

"The new bridge over the Cádiz Bay. Design and construction challenges"