Technische Universität Braunschweig

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Modelle für die Beschreibung der Zustandsänderung bei Alterung von Baustoffen

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On the estimation of thermal properties of building materials using temperature and heat flux measurements

Donnerstag, 31.08.2017, 14.00 Uhr
Institut für Wissenschaftliches Rechnen
Mühlenpfordtstrasse 23, 8. OG, Raum 812

In this talk, we introduce some tools to retrieve building material thermal properties when temperature and heat flux measurements are made available through an experiment conducted in an environmental chamber [1]. To this purpose, we first show how to analyze the posed inverse problem by adopting a hierarchical Bayesian framework, that we have proposed recently [2] for parameter estimation in linear time-dependent partial differential equations with noisy boundary conditions. Using such an approach, we may recommend the user about the design of experiments through the computation of the information gain. Finally, we introduce a marginalized Ensemble Kalman filter algorithm that, under a sequential setting, allows the combined state and thermal parameters estimation.

Marco Scavino is Associate Professor in Statistics at the Universidad de la República (UdelaR), Institute of Statistics, in Montevideo, Uruguay. He coordinated the Master in Mathematical Engineering program at UdelaR from February 2009 to August 2013 and developed the curriculum in statistics, probability and mathematics for graduate and undergraduate degrees in UdelaR, ORT. As a visiting Faculty at the King Abdullah University of Science and Technology (KAUST) SRI Center for Uncertainty Quantification in Computational Sciences and Engineering from September 2013 to June 2016, he developed the curriculum in the Applied Mathematics & Computational Science program at KAUST. He graduated with full honors in Statistics and Demography at the University "La Sapienza" Roma in 1995 and earned a doctorate in Statistics from the University of Padova in 1999. Current research interests focus on the design of experiments from a Bayesian perspective, calibration, and validation of mathematical-statistical models for the prediction of fatigue life of metallic materials, stochastic processes and their applications.

[1] Marco Iglesias, Zaid Sawlan, Marco Scavino, Raúl Tempone & Christopher Wood (2017). Bayesian inferences of the thermal properties of a wall using temperature and heat flux measurements. Submitted.https://arxiv.org/abs/1608.03855, March.
[2] Fabrizio Ruggeri, Zaid Sawlan, Marco Scavino & Raúl Tempone (2016). A Hierarchical Bayesian Setting for an Inverse Problem in Linear Parabolic PDEs with Noisy Boundary Conditions, Bayesian Analysis, doi: 10.1214/16-BA1007.