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# BAYESIAN ESTIMATION OF MODEL PARAMETERS DESCRIBING DAMAGE AND ELASTOPLASTICITY

**BOJANA V. ROSIĆ[1)], JULIEN WAYETENS[2)] AND HERMANN G. MATTHIES[1)]**

[1)]Institute of Scientific Computing
Technische Universität Braunschweig
38106 Braunschweig
e-mail: bojana.rosic@tu-bs.de/

[2)]Université Paris-Est, IFSTTAR
Cit Descartes, 14-20 Boulevard Newton, F-77447 Marne-la-Valle, France
e-mail: julien.waeytens@ifsttar.fr,

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**Abstract.** The state or parameter estimation from given observations of a mechanical system is generally an ill-posed inverse problem. The solution often does not exist, it is not unique and it is highly sensitive on the data perturbations. To resolve this issue, the deterministic identification procedures use different kinds of regularisation techniques which as a final result deliver a point estimate of the solution. On the other hand, the inverse problem seen in a probabilistic Bayesian point of view does not encounter these difficulties. Namely, the parameter/state is modelled as random variable such that the process of obtaining more information through experiments becomes well-posed. In this work the functional approximation of uncertainty is used to develop effective scheme for the computation of the predicted measurement in a form of non-intrusive stochastic Galerkin method. Furthermore, a polynomial chaos based Bayesian procedure is employed for the estimation of yield stress or geometrical model parameters describing associative elastoplasticity, as well as for the identification of damage in a concrete beam due to overloading or corrosion effects.