

Bayesian inversion of GIXRF measurements for parameter estimations with uncertainties

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X-ray fluorescence techniques are fast, indirect and non-destructive methods for the determination of material distributions and shape parameters of nano structures. Profile parameters are obtained from fluorescence intensities by solving an inverse problem. In this presentation, we determine the complete distributions of profile parameters using Bayesian inference. To calculate the posterior distributions, it is necessary to evaluate the forward model many times, which is not feasible for computationally demanding forward models. To circumvent this, we employ a polynomial chaos expansion of the forward model to construct a surrogate model. This enables us not only to use Bayesian inversion for parameter reconstructions, but also to perform a global sensitivity analysis without additional computational costs. Finally, we discuss the strength and limitations of the presented approach.