

The Bayesian Approach to Inverse Problems

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I will show that a range of inverse problems, when formulated using the Bayesian approach, lead to the problem of sampling a probability measure on a Banach space. When the prior is a Gaussian random field, then the posterior measure is defined via its density wrt the Gaussian. I will discuss properties of the posterior measure and show how these properties can be used to design efficient MCMC-based sampling algorithms which are robust under refinement of finite dimensional approximation of the Banach space. In particular I will demonstrate the central role of stochastic PDEs, and Hamiltonian PDEs with random data. in the construction of these methods.