An Abstract Convex Inversion Framework
for Elliptic Stochastic Inverse Problems

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Abstract: Motivated by the necessity to identify stochastic parameters in a wide range of stochastic partial differential equations, an abstract inversion framework will be presented. We will study the stochastic inverse problem in a stochastic optimization framework. The essential properties of the solution map and the solvability of the stochastic optimization problems will be presented. Novel convergence rates for the stochastic inverse problem will be given in the abstract formulation without requiring the so-called smallness condition. Under the assumption of finite-dimensional noise, the stochastic inverse problem will be parametrized and solved by using the Stochastic Galerkin discretization scheme. Applications to estimating stochastic Lamé parameters in the system of linear elasticity will be discussed. We will present numerical results to show the feasibility and efficacy of the developed framework.