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Efficient Iterative Algorithms for the Stochastic Finite Element Method with Application to Acoustic Scattering

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In this study, we describe the algebraic computations required to implement the stochastic finite element method for solving problems in which uncertainty is restricted to right hand side data coming from forcing functions or boundary conditions. We show that the solution can be represented in a compact outer product form which leads to efficiencies in both work and storage, and we demonstrate that block iterative methods for algebraic systems with multiple right hand sides can be used to advantage to compute this solution. We also show how to generate a variety of statistical quantities from the computed solution. Finally, we examine the behavior of these statistical quantities in one setting derived from a model of acoustic scattering.