Sparse Grid Collocation for Uncertainty Quantification

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This talk will start by mentioning examples of a few stochastic problems. We'll show how integration is used as a means of weighting and averaging out uncertainties, and consider the behavior of product rules and Monte Carlo methods for estimating integrals. We'll suggest that the accuracy of the product rule can be achieved at a much lower cost, by using Smolyak's sparse grid definition. We'll then look at a common form of the sparse grid based on the Clenshaw Curtis rule. We'll finish with some numerical examples that emphasize how nice it is to have something converge quickly in a high dimensional space!