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Adaptive Sparse Grids for Fusion Relevant High Dimensional PDEs.[1] DAVID GREEN, LIN MU, ED D'AZEVEDO, Oak Ridge National Laboratory, TYLER MCDANIEL, University of Tennessee, Knoxville, WAEL ELWASIF, GRAHAM LOPEZ, Oak Ridge National Laboratory, TIMOTHY YOUNKIN, University of Tennessee, Knoxville, ADAM MCDANIEL, South Doyle High School, Knoxville, Tennessee — Predicting the behavior of magnetic confinement fusion devices requires the solution of high dimensional PDEs. Traditional grid- or mesh-based methods for solving such systems in a noise-free manner quickly become intractable due to the scaling of the degrees of freedom going as O(N^d), sometimes called "the curse of dimensionality." We are developing an arbitrarily high-order discontinuous-Galerkin finite-element solver that leverages the sparse-grid discretization whose degrees of freedom scale as O(N*log2N^D-1). In this paper, we employ the adaptive aspect of our solver in a study of how adaptivity in the selection rule for truncating the tensor products affects the advantages of sparse-grids for fusion relevant problems.

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David Green
Oak Ridge National Laboratory

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