Adaptive Pseudo-Spectral Methods for Sixth Dimensional PDEs

Multiresolution Adaptive Numerical Environment for Scientific Simulations (MADNESS)

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Abstract

We present preliminary results on the solutions of 6-D Schrodinger equations arising from descriptions of two-particle theory based on multiresolution analysis and low-separation rank representations of functions and operators to relatively high precision. Preliminary results for solving Fokker-Planck equation will also presented. As a part of the solution process, a geometric treatment of hyperplane type of singularities is given, and a robust optimization algorithm for constructing low-separation rank approximation and low rank update of operators and functions in 3-6D with associated calculus is derived. These methods are implemented using the scalable software MADNESS.