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Variance Extrapolation in an Oscillator Basis[1] ISABELLA M. ZANE, Texas A&M University, University of Notre Dame, MARK A. CAPRIO, PATRICK J. FASANO, University of Notre Dame, CALVIN W. JOHNSON, San Diego State University — The nuclear many-body problem is a challenging infinite-dimensional problem, for which only approximate results can be obtained. The solution can be approximated by solving the problem in a truncated, finite basis. However, the accuracy is limited by the largest basis accessible to current computational methods. Extrapolation techniques attempt to use results from calculations in smaller spaces to estimate the result which would be obtained from a calculation in a larger space. Extrapolation based on the energy variance of approximate eigenstates has been successfully applied in condensed matter physics and the nuclear Monte Carlo shell model. Here, we investigate the applicability of variance extrapolation to the no-core shell model (NCSM), a method for solving the nuclear many-body problem in a basis of oscillator functions. To explore the properties of variance extrapolation in an oscillator basis, we first consider a simpler one-dimensional problem. We then extend the variance extrapolation approach to NCSM calculations for light nuclei.

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