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Renormalization of general one- and two-body operators in the no-core shell model IONEL STETCU, BRUCE R. BARRETT, University of Arizona, PETR NAVRATIL, Lawrence Livermore National Laboratory, JAMES P. VARY, Iowa State University — We implement an effective operator formalism for general one- and two-body operators, obtaining results consistent with the no-core shell model (NCSM) wave functions. The Argonne V8' nucleon-nucleon potential was used in order to obtain realistic wave functions for ^{4}He, ^{6}Li and ^{12}C. In the NCSM formalism, we compute electromagnetic properties using the two-body cluster approximation for the effective operators and obtain results which are sensitive to the range of the bare operator. To illuminate the dependence on the range, we employ a Gaussian two-body operator of variable range, finding weak renormalization of long range operators (e.g., quadrupole) in a fixed model space. This is understood in terms of the two-body cluster approximation which accounts mainly for short-range correlations. Consequently, short range operators, such as the relative kinetic energy, will be well renormalized in the two-body cluster approximation. In particular, we show that the expectation values of operators involving large momentum transfer become independent of the model space and harmonic oscillator frequency used in calculation, even in the two-body cluster approximation. I.S. and B.R.B acknowledge partial support by NFS grants PHY0070858 and PHY0244389. P.N. received support from LDRD contract 04-ERD-058 and USDOE contract No. W-7405-Eng-48. J.P.V. acknowledges partial support by USDOE grant No DE-FG-02-87ER-40371.

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