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Alternative Similarity Renormalization Group Generators in Nuclear Structure Calculations NUIOK DICAIRE, Univ of Ottawa, CONOR OMAND, University of British Columbia, PETR NAVRÁTIL, TRIUMF — The Similarity Renormalization Group (SRG) has been successfully applied to soften interactions for *ab initio* nuclear calculations. In almost all practical applications in nuclear physics, an SRG generator with the kinetic energy operator was used. With this choice, a fast convergence of many-body calculations can be achieved, but at the same time substantial three-body interactions are induced even if one starts from purely two-nucleon (NN) Hamiltonian. Three-nucleon (3N) interactions can be handled by modern many-body methods. However, it has been observed that when including initial chiral 3N forces in the Hamiltonian, the SRG transformations induce non-negligible four-nucleon interactions that cannot be currently included in calculations for technical reasons. Consequently, it is essential to investigate alternative SRG generators that might suppress the induction of many-body forces while at the same time might preserve the good convergence. We present different alternative generators with operators of block structure in the harmonic oscillator basis. In the no-core shell model calculations for ^{3}H, ^{4}He and ^{6}Li with chiral NN force, we demonstrate that they appear quite promising.

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