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Three Dimensional SRG Evolution of the NN Interaction Using Picard Iteration M.R. HADIZADEH, Department of Physics and Astronomy and Institute of Nuclear and Particle Physics, Ohio University, Athens, OH 45701, K.A. WENDT, Department of Physics and Astronomy, University of Tennessee, Knoxville, TN 37996 and Physics Division, Oak Ridge National Laboratory, Oak Ridge, TN, CH. ELSTER, Department of Physics and Astronomy and Institute of Nuclear and Particle Physics, Ohio University, Athens, OH 45701 — We solve the similarity renormalization group (SRG) flow equations in a Three Dimensional (3D) helicity representation (without partial wave decomposition) for realistic nucleon-nucleon (NN) interactions. During the 3D SRG evolution, the flow equations become extremely stiff for far off diagonal matrix elements (e.g. $|\mathbf{k}| \gg |\mathbf{k}'|$). We alleviate this by transforming the differential form of the SRG flow equation into an integral equation that is solved using Picard iteration. The evolved NN interactions are obtained from realistic potentials by solving a single integral equation for total spin 0 and four coupled integral equations for total spin 1. We demonstrate the efficiency and accuracy of the Picard integral approach for the Bonn-B and Chiral-N2LO NN potentials. The successful 3D implementation paves the path to consider a 3D evolution of three-nucleon forces.

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