

Abstract Submitted
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**Computer Code for Calculating Matrix Elements and Overlaps
of States for the Generalized Seniority Scheme via Recurrence Relations**

KE CAI, Bard College, MARK CAPRIO, FENGQIAO LUO, University of Notre Dame — The generalized seniority approximation provides a truncation scheme for the nuclear shell model based on building the states of the nucleus from nucleon pairs. We developed a computer code to calculate matrix elements of one-body and two-body operators between generalized seniority states and overlaps of these states based on a set of recurrence relations. The main steps in our implementation of the computer code consisted of: (1) Developing an object-oriented framework for storing information on generalized seniority states; (2) Applying the symmetries of the problem and caching intermediate results to avoid repeated calculations; (3) Performing extensive validations. The code can be used to calculate matrix elements of operators of physical interest, e.g., the Hamiltonian and electromagnetic transition operators. Planned applications of the code include testing the structure of nucleon pairs and studying the mapping of shell model onto the Interacting Boson Model. Supported by the US DOE under grant DE-FG02-95ER-40934.

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