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Coupling Algorithm for $\mathrm{Sp}(3,\mathrm{R})$ **Irreducible Representations**[1]
JAMES F. ST. GERMAINE-FULLER, Grinnell College, ANNA E. MCCOY, MARK A. CAPRIO, University of Notre Dame — The nuclear symplectic model based on $\mathrm{Sp}(3,\mathrm{R})$ – the smallest algebra that contains both the shell model Hamiltonian and the rotor algebra – connects the microscopic shell model to collective rotational behavior and naturally extends the Elliot SU(3) model to multiple shells. However, $\mathrm{Sp}(3,\mathrm{R})$ is only an approximate symmetry of the nucleus which can be broken by spin-orbit interactions, tensor force interactions, and pairing. The Hamiltonians in most physical situations will break $\mathrm{Sp}(3,\mathrm{R})$ symmetry, causing their eigenstates to become linear combinations of symplectic irreducible representations (irreps). Calculations with those eigenstates will then involve multiple irreps. We report a computer algorithm for enumerating the irreps that arise from the coupling of two symplectice irreps and evaluating their multiplicities in the product. This should assist in performing such multi-irrep calculations and facilitate computing symplectic coupling coefficients.

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