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Generalization of Magnetic Dimer Excitations G. HOUCHINS, J.T. HARALDSEN, Department of Physics and Astronomy, James Madison University — Magnetic dimers commonly appear in the study of molecular magnets and quantum dots. Here, we discuss analytical representations for the inelastic neutron scattering excitation cross sections and static structure factor for the general S_1S_2 dimeric system. Employing generalized Pauli matrices and the Kronecker tensor product to construct the matrix representation of the spin Heisenberg spin-spin Hamiltonian. After using exact diagonalization to determine the eigenstates of the spin Hamiltonian, we formulated an analytical solution to find the structure factor coefficients used in determining the inelastic neutron scattering excitation cross section from both the ground state and first excited state. We also detail a method for finding the S_z polarization constant within an applied field that may represent the presence of an external magnetic field. Furthermore, we provide a sample set of data and intensity plot generated from our results to illustrate experimental representations for split energy levels.

Jason Haraldsen
James Madison University

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