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Ground-State of the Dimerized 1D Heisenberg Model with Next Nearest Neighbor Interaction MEI WAI TSUI, Kingsborough Community College of CUNY, ERIC ASHENDORF, Brooklyn College, JAY D. MANCINI, Kingsborough Community College of CUNY, VASSILIOS FESSATIDIS, Fordham University, SAMUEL P. BOWEN, Chicago State University — A well-known variant of the one-dimensional antiferromagnetic spin 1/2 Heisenberg model includes explicit dimerization and was first studied by Cross and Fisher many years ago. The Hamiltonian is given by H=J$_1$ $\sum_{l=1}^{2N-1} \left(1-(-1)^l\,\delta\right) \vec{S}_l \cdot \vec{S}_{l+1} + J_2 \sum_{l=1}^{2N-2} \vec{S}_l \cdot \vec{S}_{l+2} where$J$_1$ is the nearest neighbor interaction (here we take $J_1 = 1$), δ ($0 \leq \delta \leq 1$) is the dimerization and J_2 ($0 \leq J_2 \leq 2$) is the next-nearest neighbor interaction. Here we shall apply both a Lanczos matrix truncation as well as a Connected Moments approach to study both the ground-state energy as well as the energy gap.

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