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Ground-State Energy of A Two-Level System with Phonon Coupling WILLIAM J. MASSANO, SUNY Maritime, VASSILIOS FESSATIDIS, Fordham University, JAY D. MANCINI, Kingsborough College of CUNY, SAMUEL P. BOWEN, Chicago State University — The coupling of a two-level system to a quantized boson mode has been the focus of many researchers for a number of years. Applications to exciton motion, molecular polaron formation, chaos in quantum systems as well as a number of other effects in condensed matter physics have also been studied. Here we investigate the interaction of a single bosonic mode with a two-level fermionic system given by the Hamiltonian

$$H = -\delta_0 \sigma_x + \sum_k \hbar\omega_k a_k^\dagger + \sum_k g_k \left(a_k^\dagger + a_k\right) \sigma_z.$$

This quantum system is used as a testing ground for a newly developed Generalized Moments Expansion, GMX(m, n), of which the well-known Connected Moments Expansion (CMX) and Alternate Moments Expansion (AMX) are special cases: CMX=GMX$(1, 1)$, AMX=GMX$(1, 2)$. The convergence and viability of this scheme is discussed and comparisons are made with other methods.

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