Extended RPA with ground-state correlations

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abstract
We propose a time-independent method for finding a correlated ground state of an extended time-dependent Hartree-Fock theory, known as the time-dependent density-matrix theory (TDDM). The correlated ground state is used to formulate the small amplitude limit of TDDM (STDDM) which is a version of extended RPA theories with ground-state correlations. To demonstrate the feasibility of the method, we calculate the ground state of $^{22}$O and study the first $2^+$ state and its two-phonon states using STDDM.