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Convergent Sequences of Thermodynamic Greens Functions S. P.

BOWEN, Chicago State University, J. D. MANCINI, Kingsborough Community College of CUNY, V. FESSATIDIS, Fordham University — The frequency Fourier transform of thermodynamic greens functions can be represented as matrix elements of the resolvent of the Liouville operator with respect to one of two inner products. These inner products involve thermal averages of commutators or anti-commutators of various operators in which the vectors within the inner products contain factors of creation and annihilation operators. Sequences of increasingly-sized truncated resolvent matrices are guaranteed to converge to exact results. Each of the approximations is non-perturbative in that the eigen-energies of each truncation arise from secular determinants. The thermodynamic equations for detailed balance provide a means of determining an iterative sequence of thermal expectation values, whose limit points determine the thermal equilibrium values. The anti-commutator inner product space includes odd numbered factors of Fermi operators while the commutator inner product space includes spins, Bosons, and even numbers of factors of Fermions. Of particular note is the fact that the commutator space contains vectors whose norm squared can be either positive or negative. Several examples of this formulation will be illustrated.

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