

Rayleigh-Schrödinger perturbation series for Jacobi matrices and Quantum Rabi Model

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We investigate eigenvalue perturbations for a class of infinite tridiagonal matrices which define unbounded self-adjoint operators with discrete spectrum. In particular we obtain explicit estimates for the convergence radius of the perturbation series and error estimates for the Quantum Rabi model including the resonance case. We also give expressions for coefficients near resonance in order to evaluate the quality of the rotating wave approximation due to Jaynes and Cummings.