

Matrix Perturbation Theory

Consider a free hamiltonian H_0 for a quantum system with just two (non-degenerate) energy levels. Assume H_0 has been diagonalized. Now consider a perturbation:

$$H' = \lambda \begin{pmatrix} 0 & (a + ib) \\ (a - ib) & 0 \end{pmatrix}$$

where a and b are real, and λ is a small (also real) perturbation parameter.

- (a) Use second order perturbation theory to compute the perturbed energy eigenvalues.
- (b) Find the exact eigenvalues and expand in the perturbation parameter λ to compare with your results from (a).
- (c) Comment on your result.

Matrix Perturbation Theory

Rachel S Tattersall



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