Schrodinger's Equation

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Abstract

Using a sixth-order finite difference method, we solve for the one dimensional, time-independent Schrodinger's equation's wave function $\psi(x)$ for a particle of mass m in a infinite square well and quantum harmonic oscillator potential $V(x)$. We solve the wave function for the unperturbed and perturbed infinite square well and quantum harmonic oscillator. For the unperturbed infinite square well, the non-spurious, spurious modes, and accuracy of the eigenvalues are explored. The unperturbed quantum harmonic oscillator's computed wave functions are compared to some exact solutions. The perturbed systems are observed and plotted for different perturbations. The accuracy of the computed eigenmodes are compared to the eigenmodes found using the first-order perturbation theory.