

9.7: Particle in a Slanted Well Potential

Numerical Solutions for Schrödinger's Equation for the Particle in the Slanted Box

Parameters go here: $x_{max} = 1$ $\mu = 1$ $V_0 = 2$

Potential energy $V(x) = V_0 x$

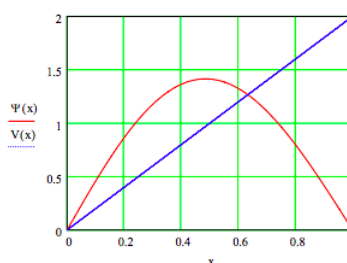
Given

$$-\frac{1}{2\mu} \frac{d^2}{dx^2} \psi(x) + V(x)\psi(x) = E\psi(x)$$

with these boundary conditions: $\psi(0) = 0$ and $\psi'(0) = 0.1$

$\psi = \text{Odesolve}(x, x_{max})$ Normalize wavefunction: $\psi(x) = \frac{\psi(x)}{\sqrt{\int_0^{x_{max}} \psi(x)^2 dx}}$

Enter energy guess: $E = 5.925$



Calculate most probably position: $x = 0.5$ Given $\frac{d}{dx} \psi(x) = 0$ Find $(x) = 0.485$

Calculate average position: $X_{avg} = \int_0^1 \psi(x)(x)\psi(x)dx$ $X_{avg} = 0.491$

Calculate potential and kinetic energy:

$$V_{avg} = V_0 X_{avg} \quad V_{avg} = 0.983$$

$$T_{avg} = E - V_{avg} \quad T_{avg} = 4.942$$

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