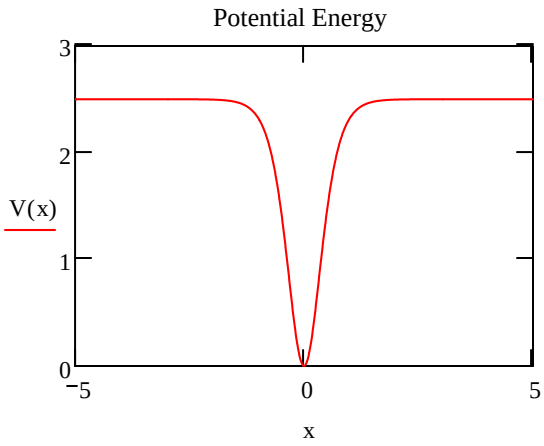
Numerical Solutions for Schrodinger's Equation for the Feshbach Potential

Frank Rioux
Chemistry Department
CSB|SJU

Parameters go here: $x_{max} := 5$ $m := 1$ $V_0 := 2.5$ $\mu := 0$ $d := .5$

Potential energy:

$$V(x) := V_0 \cdot \tanh\left(\frac{x}{d}\right)^2$$



Given $\frac{-1}{2 \cdot m} \cdot \left(\frac{d^2}{dx^2}\Psi(x)\right) + V(x) \cdot \Psi(x) = E \cdot \Psi(x)$ $\Psi(-x_{max}) = 0$ $\Psi'(-x_{max}) = 0.1$

$\Psi := \text{Odesolve}(x, x_{max})$

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

Enter energy guess: $E \equiv 1.44949$