

Numerical Solutions for the Morse Function

Integration limits: $x_{\min} := -2$ $x_{\max} := 12$

Morse parameters: $\beta := 1$ $\mu := 1$ $D := 2$

Morse potential function: $V(x) := D \cdot (1 - \exp(-\beta \cdot x))^2$

Enter energy guess: $E := 1.875$

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

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

