Potential energy functions

One-dimensional example potential for projects 01 and 11

$$V(x) = -\ln\left[e^{-\frac{(x-30)^2}{70}} + e^{-\frac{(x-60)^2}{500}} + e^{-\frac{(x-130)^2}{800}} + e^{-\frac{(x-180)^2}{600}}\right] \tag{1}$$

Range: $0 \leq x \leq 300$

Two-dimensional example potentials for projects 05, 06, and 07

The potential energy functions are constructed as

$$V(x,y) \quad = \quad -\ln\left[f(x,y)\right] \tag{2}$$

where examples for $f(x,y)$ are

$$f(x,y) \quad = \quad e^{-\frac{(x-30)^2}{200}} e^{-\frac{(y-50)^2}{170}} + 2 \cdot e^{-\frac{(x-80)^2}{800}} e^{-\frac{(y-80)^2}{170}} + 2 \cdot e^{-\frac{(x-140)^2}{1100}} e^{-\frac{(y-140)^2}{1100}} \tag{3}$$

and

$$\begin{aligned} f(x,y) \quad = \quad & e^{-\frac{(x-30)^2}{200}} e^{-\frac{(y-40)^2}{170}} + 2 \cdot e^{-\frac{(x-80)^2}{800}} e^{-\frac{(y-80)^2}{170}} + 2 \cdot e^{-\frac{(x-190)^2}{1000}} e^{-\frac{(y-190)^2}{1000}} \\ & + 1.2 \cdot e^{-\frac{(x-100)^2}{2000}} e^{-\frac{(y-200)^2}{200}} + 1.2 \cdot e^{-\frac{(x-200)^2}{200}} e^{-\frac{(y-100)^2}{2000}} + e^{-\frac{(x-110)^2}{2000}} e^{-\frac{(y-110)^2}{170}} . \end{aligned} \tag{4}$$

Range: $0 \leq x \leq 300$, $0 \leq y \leq 300$

Two-dimensional example potentials for projects 08, 09, and 11

The potential energy functions are constructed as

$$V(x) \quad = \quad -\ln\left[f(x)\right] \tag{5}$$

where examples for $f(x)$ are

$$f(x) \quad = \quad 3 \cdot e^{-\frac{(x-30)^2}{150}} , \tag{6}$$

$$f(x) \quad = \quad e^{-\frac{(x-125)^2}{800}} + 1.2 \cdot e^{-\frac{(x-165)^2}{200}} + e^{-\frac{(x-215)^2}{600}} , \tag{7}$$

$$f(x) \quad = \quad 2.5 \cdot e^{-\frac{(x-140)^2}{100}} + 1.5 \cdot e^{-\frac{(x-160)^2}{100}} + 1.5 \cdot e^{-\frac{(x-180)^2}{100}} , \tag{8}$$

$$f(x) \quad = \quad 1.5 \cdot e^{-\frac{(x-80)^2}{800}} , \tag{9}$$

and

$$f(x) \quad = \quad e^{-\frac{(x-100)^2}{800}} + 1.5 \cdot e^{-\frac{(x-180)^2}{600}} , \tag{10}$$

Range: $0 \leq x \leq 300$