We’d like to make a -d potential that will have short range repulsion, a stable point at some chosen distance, and outside of these regions energy drops exponentially. The potential also need to be at least twice differentiable.

This potential has 6 parameters in two categories. Repulsion parameters set the form of the very short range repulsion. set the strength, rest length and width of the cup.

The gradient of this energy form:

Gradients of interaction variables:

Hessian of objects: