

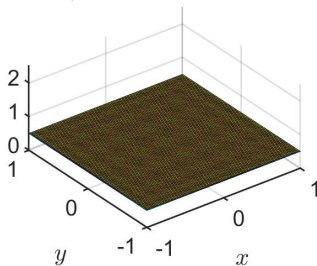
PDE-Constrained Optimization for Multiscale Particle Dynamics

$$\min_{\rho, \mathbf{w}} \frac{1}{2} \|\rho - \hat{\rho}\|_{L^2}^2 + \frac{\beta}{2} \|\mathbf{w}\|_{L^2}^2$$

subject to:

$$\partial_t \rho = \Delta \rho - \nabla \cdot (\rho \mathbf{w}) + \nabla \cdot \int_{\Omega} \rho(\mathbf{x}) \rho(\mathbf{x}') \nabla V_2(|\mathbf{x} - \mathbf{x}'|) d\mathbf{x} \quad + \text{BC} + \text{IC}$$

ρ initial condition



$\hat{\rho}$ desired state

