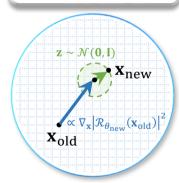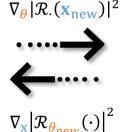Langevin Dynamics in PDE Domain $\Omega$

Gradient Descent in Parameter Space $\Theta$

$$\nabla_{\theta}|\mathcal{R}_{\cdot}(\mathbf{x}_{new})|^2$$

$$\nabla_{\mathbf{x}}|\mathcal{R}_{\theta_{new}}(\cdot)|^2$$

$\mathbf{z} \sim \mathcal{N}(\mathbf{0}, \mathbf{I})$

$\mathbf{x}_{new}$

$\propto \nabla_{\mathbf{x}}|\mathcal{R}_{\theta_{new}}(\mathbf{x}_{old})|^2$

$\mathbf{x}_{old}$

$\propto -\nabla_{\theta}|\mathcal{R}_{\theta_{old}}(\mathbf{x}_{new})|^2$

$\theta_{old}$

$\theta_{new}$