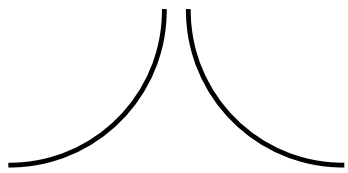
MOLECULAR DYNAMICS SIMULATION

T=0 Overdamped dynamics

Parabolic pinning potentials

Vortex potential



Vortex-vortex interactions,
vortex-pin interactions,
driving current

Vortex velocity is proportional to the forces acting on it

$$\mathbf{f}_i = \mathbf{f}_i^{vv} + \mathbf{f}_i^{vp} + \mathbf{f}_d = \eta \mathbf{v}_i$$

$$\mathbf{f}_i = \sum_{j=1}^{N_v} f_0 \; K_1\left(\frac{|\mathbf{r}_i - \mathbf{r}_j|}{\lambda}\right) \hat{\mathbf{r}}_{ij} + \sum_{k=1}^{N_p} \frac{f_p}{\xi_p} \, |\mathbf{r}_i - \mathbf{r}_k^{(p)}| \; \Theta\left(\frac{\xi_p - |\mathbf{r}_i - \mathbf{r}_k^{(p)}|}{\lambda}\right) \hat{\mathbf{r}}_{ik}$$

$$\hat{\mathbf{r}}_{ij} = \frac{\mathbf{r}_i - \mathbf{r}_j}{|\mathbf{r}_i - \mathbf{r}_j|}, \quad \hat{\mathbf{r}}_{ik} = \frac{\mathbf{r}_i - \mathbf{r}_k^{(p)}}{|\mathbf{r}_i - \mathbf{r}_k^{(p)}|}, \quad f_0 = \frac{\Phi_0^2}{8\pi^2\lambda^3}$$