

Supplementary Material: Solute Dispersion in Pre-Turbulent Confined Active Nematics

DESCRIPTIONS OF SUPPLEMENTARY VIDEOS

Supplementary Video 1: Time evolution of the director field in the *oscillatory regime*, with the same color code as figure 1 of the main text. The activity is $\zeta = 0.0085$. The video spans 50,000 simulation units.

Supplementary Video 2: Time evolution of the director field in the *dancing regime*, with the same color code as figure 1 of the main text. The activity is $\zeta = 0.0013$. The video spans 300,000 simulation units.

Supplementary Video 3: Time evolution of the flow field in the *oscillatory regime*, with the same color code as figure 1 of the main text. The activity is $\zeta = 0.0013$. The video spans 300,000 simulation units.

Supplementary Video 4: Time evolution of the flow field in the *dancing regime*. The activity is $\zeta = 0.013$. The video spans 300,000 simulation units.

Supplementary Video 5: Time evolution of the vorticity field in the *dancing regime*. The oscillations of the vorticity are more prominent. The activity is $\zeta = 0.013$. The video spans 300,000 simulation units.

Supplementary Video 6: Solute dispersion in the *oscillatory regime*. The activity is $\zeta = 0.0085$. The video spans about 200,000 simulation units.

Supplementary Video 7: Solute dispersion in the *dancing regime*. The activity is $\zeta = 0.013$. The video spans about 200,000 simulation units.

Supplementary Video 8: Tracer motion in the *oscillatory regime*. The activity is $\zeta = 0.0085$. The video spans about 70,000 simulation units.

Supplementary Video 9: Tracer motion in the *dancing regime*. The activity is $\zeta = 0.013$. The video spans about 200,000 simulation units.