

Description of Additional Supplementary Files

Supplementary Movie 1: Pear-shaped rollers in the vortex state (mode β). $E = 1.92 \text{ V } \mu\text{m}^{-1}$. $\phi = 0.108$. The movie is 21.5 times slower than the real time.

Supplementary Movie 2: β -vortex. $E = 1.92 \text{ V } \mu\text{m}^{-1}$. $\phi = 0.108$. The frame size is 0.25 mm by 0.24 mm. The movie is 21.5 times slower than the real time.

Supplementary Movie 3: Velocity and vorticity fields of pear-shaped rollers in the vortex state (mode β). $E = 1.92 \text{ V } \mu\text{m}^{-1}$. $\phi = 0.108$. The movie is 2.15 times slower than the real time.

Supplementary Movie 4: Pear-shaped rollers in the state of rotating flocks. $E = 2.40 \text{ V } \mu\text{m}^{-1}$. $\phi = 0.254$. The movie is 21.5 times slower than the real time.

Supplementary Movie 5: Rotating flock. $E = 2.40 \text{ V } \mu\text{m}^{-1}$. $\phi = 0.254$. The frame size is 0.25 mm by 0.25 mm. The movie is 21.5 times slower than the real time.

Supplementary Movie 6: Velocity and vorticity fields of pear-shaped rollers in the state of rotating flocks. $E = 2.40 \text{ V } \mu\text{m}^{-1}$. $\phi = 0.254$. The movie is 21.5 times slower than the real time.

Supplementary Movie 7: α -vortex. $E = 1.76 \text{ V } \mu\text{m}^{-1}$. $\phi = 0.108$. The frame size is 0.25 mm by 0.25 mm. The movie is 21.5 times slower than the real time.

Supplementary Movie 8: γ -vortex. $E = 2.08 \text{ V } \mu\text{m}^{-1}$. $\phi = 0.108$. The frame size is 0.25 mm by 0.25 mm. The movie is 21.5 times slower than the real time.

Supplementary Movie 9: Spinners. $E = 2.80 \text{ V } \mu\text{m}^{-1}$. $\phi = 0.054$. The frame size is 0.25 mm by 0.25 mm. The movie is 21.5 times slower than the real time.