

Supplemental Movie Legends

Movie S1. Fluorescent actin in an active liquid crystal with low elasticity ($K_{11} = 0.26$ pN, $K_{33} = 0.13$ pN) driven by myosin II motors (unlabeled).

Movie S2. Fluorescent actin in an active liquid crystal with high elasticity ($K_{11} = 0.52$ pN, $K_{33} = 1.04$ pN) driven by myosin II motors (unlabeled).

Movie S3. Fluorescent actin (grayscale) in an active liquid crystal doped with a sparse quantity of microtubules (red) ($K_{11} = 0.26$ pN, $K_{33} = 1.04$ pN) and driven by myosin II motors.

Movie S4. Hydrodynamic simulation of active nematic with black lines indicating local nematic director field and heat scale indicates magnitude of bend distortion.

Movie S5. Fluorescent actin images of a band in an active nematic, illustrating the motion of a $+1/2$ defect (blue chevron) through a band leaving a uniform nematic in its wake.

Movie S6. Fluorescent actin images of a band in an active nematic, illustrating its annihilation through creation of a $\pm 1/2$ defect pair (blue and red arrows) and their catapulting through the nematic.

Movie S7. Fluorescent actin images of a band in an active nematic, showing distinct dynamics of $+1/2$ defects. The $+1/2$ defect indicated by the blue arrow moves at a much greater speed than that of the surrounding nematic and defects (e.g. red arrow), due to its “catapulting” via band annihilation.

Movie S8. Fluorescent actin in an active liquid crystal with high elasticity ($K_{11} = 0.52$ pN, $K_{33} = 1.04$ pN) driven by myosin VI motors (unlabeled). The bands show a tendency to switch between two orthogonal directions periodically.