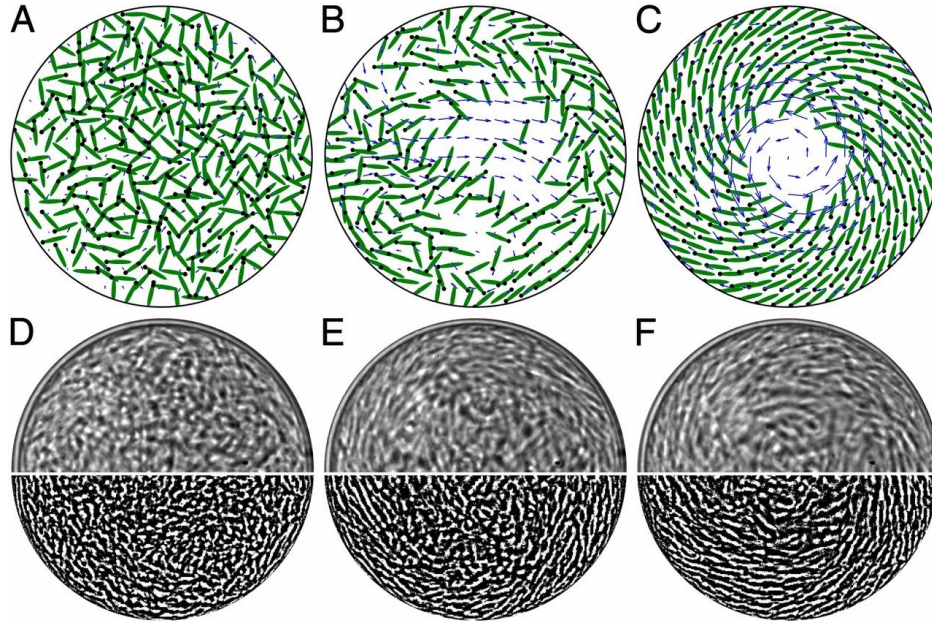


Vortex Dynamics in Active Matter

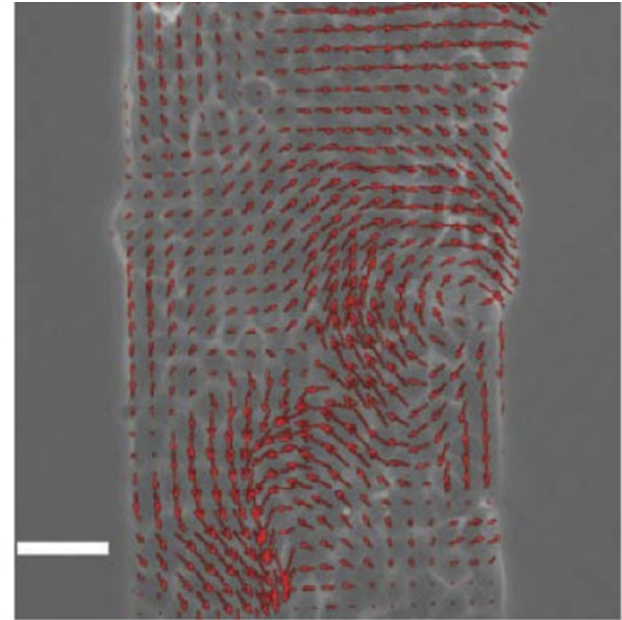
Edvard Stubberud

Veileder: Paul Gunnar Dommersnes

Motivation



Swimming bacteria¹

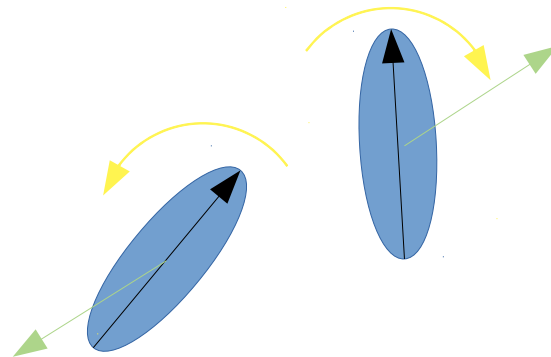
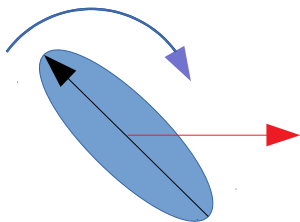


Cellular movement²

Numerical Approach: Flying XY Model

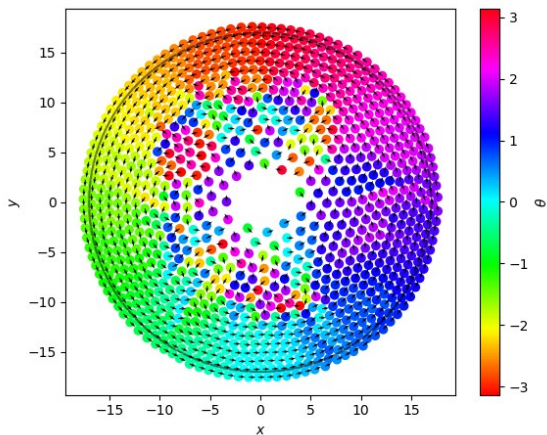
$$\frac{d\vec{r}_i(t)}{dt} = v_0 \vec{u}_i(t) + (\vec{F}_b(\vec{r}_i) + \sum_{j \neq i} \vec{F}_{pp}(\vec{r}_{ij})) / \gamma_t, \text{ and}$$

$$\frac{d\theta_i(t)}{dt} = \sqrt{2D_r} \eta(t) + (\Gamma_b(\vec{r}_i) + \sum_{j \neq i} \Gamma_{pp}(\vec{r}_{ij})) / \gamma_r.$$

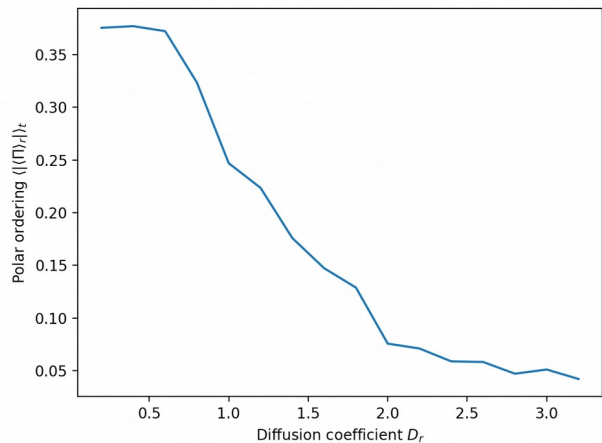


From Uniform Movement to Disorder

Ordered state



Transition



Disordered state

