

## Supplementary Material for “Mechanisms of spontaneous chain formation and subsequent microstructural evolution in shear-driven strongly confined drop monolayers”

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### Movies

- **Movie M1** – Benchmark FD/FT simulation for area fraction  $\phi_A = 0.05$  and system size  $N = 76$  particles.
- **Movie M2** – Benchmark FD/FT simulation for area fraction  $\phi_A = 0.3$  and system size  $N = 456$  particles.
- **Movie M3** – Prediction of the QI+STR model for the evolution of the benchmark system of  $N = 76$  particles at the area fraction  $\phi_A = 0.05$  with the same initial configuration as the system shown in **Movie M1**. Time  $t' = t/\varepsilon$  is rescaled by a factor  $\varepsilon = 0.6$ .
- **Movie M4** – Prediction of the QI+STR model for the evolution of the benchmark system of  $N = 456$  particles at the area fraction  $\phi_A = 0.3$  with the same initial configuration as the system shown in **Movie M1**. Time  $t' = t/\varepsilon$  is rescaled by a factor  $\varepsilon = 0.2$ .
- **Movie M5** – Prediction of the QI+STR model for a system of  $N = 512$  particles at the area fraction  $\phi_A = 0.05$ . The movie has been accelerated for  $\gamma t > 200$  to show the long-time evolution.
- **Movie M6** – Prediction of the QI+STR model for a system of  $N = 512$  particles at the area fraction  $\phi_A = 0.15$ . The movie has been accelerated for  $\gamma t > 200$  to show the long-time evolution.
- **Movie M7** – Prediction of the QI+STR model for a system of  $N = 512$  particles at the area fraction  $\phi_A = 0.3$ . The movie has been accelerated for  $\gamma t > 200$  to show the long-time evolution.
- **Movie M8** – Evolution of a hypothetical system with particles interacting via hydrodynamic Hele–Shaw quadrupolar interactions and soft isotropic repulsion of the range  $l_{st}$  for the area fraction  $\phi_A = 0.3$  and system size  $N = 456$  particles. The movie has been accelerated for  $\gamma t > 200$  to show the long-time evolution.