

Large time and large crowd limits in alignment-based dynamics

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We discuss the large time and large crowd limits for alignment-based models. In particular, we are led to consider the global regularity for a general class of Eulerian dynamics driven by a forcing with a commutator structure.

For commutators involving bounded communication kernels, existence of strong solutions follows for initial data which are sub-critical, namely -- the initial divergence is “not too negative” and the initial spectral gap is “not too large”. Singular kernels, corresponding to fractional Laplacian behave better: global regularity persists and flocking follows. Singularity helps!