Yao Yao

Congested aggregation via Newtonian interaction

In this talk, we consider a congested aggregation model that describes the evolution of a density through the competing effects of nonlocal Newtonian attraction and a hard density constraint. It is formulated as the Wasserstein gradient flow of an interaction energy, with a penalization to enforce the density constraint. From this perspective, the problem can be seen as a slow diffusion limit of the Keller-Segel equation with degenerate diffusion. We focus on the patch dynamics where the initial data is a characteristic function, and show that the solution remains a patch for all time, and its boundary evolution is given by a Hele-Shaw type free boundary problem. In addition, in two dimensions, we show that all patch solutions will converge to a disk as the time goes to infinity with certain convergence rate. This is a joint work with Katy Craig and Inwon Kim.