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# A blob method for the aggregation equation and Gamma-convergence of regularized nonlocal interaction energies

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## Abstract

The aggregation equation models the motion of particles moving to minimize a nonlocal interaction energy. Often, the interaction between particles is chosen to scale according to a power law potential, leading to aggregation or repulsion, depending on the sign of the potential. In general, the corresponding interaction energies are neither convex nor differentiable, placing them outside the scope of most existing results on energy minimization and gradient flow. In this talk, I will present joint work with Andrea Bertozzi on a new numerical method for the aggregation equation, inspired by vortex blob methods for the Euler equations. I will present quantitative results on the convergence of this regularized particle method, along with numerical examples exploring its qualitative behavior. I will then present recent work with Ihsan Topaloglu, in which we examine the effect of regularization on the nonlocal interaction energies corresponding to the aggregation equation and prove Gamma-convergence results showing that minimizers converge to minimizers and gradient flows converge to gradient flows.

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