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Height-constrained nonlocal interaction energies and their gradient flows.

Height-constrained nonlocal interaction energies and congested aggregation models, which formally can be considered as gradient flows of these energies, have recently appeared not only in models of collective behavior such as biological swarming and pedestrian crowd motion but also in simple nonlocal geometric shape optimization problems. In these models the inclusion of a height constraint on admissible functions poses significant challenges both analytically and numerically. In order to overcome these we consider a regularization of the energies by including a highly degenerate diffusion term and approximate the height-constrained model by the unconstrained ones. Justifying our approach analytically in the context of Γ-convergence we implement this scheme numerically in two dimension, and compute gradient flows via particle approximations. This is a joint project with Katy Craig. (Received January 26, 2017)