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INTERFACIAL DYNAMICS IN A MODEL OF BIOLOGICAL AGGREGATION

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I will discuss some features of a continuum model of biological aggregation introduced by Topaz, Bertozzi and Lewis. Individuals, described by the model, experience long range attraction to other individuals of their species, but try to avoid overcrowding. In the continuum model for the population density the attraction is described via a nonlocal operator, while the repulsion is modeled by a differential operator.

I will describe why such behavior leads to formation of interfaces between a near-constant-density aggregate state and the unpopulated space. The dynamics of the interfaces, and why surface-tension-like effects occur at the interfaces will be discussed.

On long time scales the interfacial motion leads to coarsening of length scales in the evolution of a typical configuration. The rate of coarsening can be studied using the Kohn-Otto framework. I will describe a geometric viewpoint that unites the coarsening results in a variety of interfacial models.

The talk is partially based on joint work with Andrea Bertozzi.