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Two-species Particle Aggregation and Co-dimension One Solutions

Systems of pairwise-interacting particles model a cornucopia of physical systems, from insect swarms and bacterial colonies to nanoparticle self-assembly. We study a continuum model for two-species particle interaction in $\mathbb{R}^2$, and apply linear stability analysis of concentric ring steady states to characterize the steady state patterns and instabilities which form. Conditions for linear well-posedness are determined and these results are compared to simulations of the discrete particle dynamics, showing predictive power of the linear theory.