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High-accuracy simulations of thousands of deformable, interacting, active droplets DAVID STEIN, Flatiron Institute, YUAN-NAN YOUNG, New Jersey Institute of Technology, MICHAEL SHELLEY, Flatiron Institute and New York University — Coarse-grained continuum models of active fluids capture important aspects of self-organizing behavior seen in experiments while providing a computationally tractable basis for their simulation. Producing accurate solutions to these models is nevertheless challenging, and numerical schemes for their solution have been largely limited to simple, stationary geometries or low-accuracy methods. In this talk, we introduce a spectrally accurate method for the simulation of active fluids in complex geometries, and show how to use this method to simulate deformable droplets of active fluids. When multiple drops are immersed in a Stokesian fluid, their interactions are captured through a robust and scalable boundary integral method, allowing for the simulation of thousands of such particles which may come into near-contact with each other. We explore some of the emergent phenomenon that occurs with such large aggregates of active droplets.

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