Abstract Submitted
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Unstable intrusion of active matter into a fluid[1] CHRISTOPHER MILES, Univ of Michigan - Ann Arbor, ARTHUR EVANS, Univ of Wisconsin - Madison, MICHAEL SHELLEY, New York University, SAVERIO SPAGNOLIE, Univ of Wisconsin - Madison — We investigate numerically and analytically the intrusion of motile and non-motile stress-generating particles into a surrounding fluid environment. Gaussian patches of initially isotropic particle orientation and initially polar particle alignment are found to extend into the fluid with geometries dependent on the mechanism of particle propulsion. In the isotropic case the particles never generate a fluid flow as the patch evolves. Patches of aligned "pusher" particles elongate in the direction of particle orientation, then undergo a transverse concentration instability, and finally converge to the classical fluctuating state with long spatial correlations. Aligned "puller" particles elongate in the direction opposite the particle orientation direction and exhibit dramatic splay as the group moves into the bulk. The dynamics are rationalized using the particle distribution moment equations and perturbation stability analysis.

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