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Stable clusters emerge from unstable fronts MICHELLE DRISCOLL, Northwestern University, BLAISE DELMOTTE, Courant Institute, NYU, MENA YOUSSEF, NYU Chemistry, WENJIE FEI, Columbia University, STEFANO SACANNA, NYU Chemistry, KYLE BISHOP, Columbia University, ALEKSANDAR DONEV, Courant Institute, NYU, PAUL CHAIKIN, NYU Physics
— Rotating colloidal particles near a surface create strong advective flows, which can lead to a rich variety of collective effects. It has recently been shown that long-lived compact motile structures, called "critters", emerge naturally from a fingering instability in this microroller system. We identified these new structures using large-scale 3D simulations, and have recently made promising steps towards producing them in the lab. Our simulations and experiments suggest that these critters are a stable state of the system, move much faster than individual rollers, and quickly respond to a changing drive. We believe that critters are unique in that they are clusters which are formed only with hydrodynamic interactions. Furthermore, as compact, self-assembled structures which can easily be remotely guided, critters may offer a promising tool for microscopic transport.

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