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Instabilities and dynamics of phoretic suspensions[1] TULLIO TRAVERSO[2], SEBASTIEN MICHELIN, Ecole Polytechnique — Suspensions of Janus phoretic colloids are a canonical example of synthetic active fluids, whose potential applications range from technological to medical ones. Individual microscopic particles self-propel as a result of self-generated chemical gradients, and influence each other hydrodynamically and chemically. Such interactions lead to spontaneous nontrivial dynamics within phoretic suspensions, on length scales much larger than the swimmer size. We use a kinetic model to investigate the competition and interaction of self-propulsion with hydrodynamic and chemical couplings, whose characteristics are fundamentally determined by the shape and surface chemical properties of the particle, which are design parameters that can be controlled and optimized. Using a combination of linear stability analysis and nonlinear numerical simulations, we discuss the role of such design parameters in determining the onset of instabilities and subsequent nonlinear collective dynamics in dilute suspensions of chemically-active Janus swimmers.

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[2]Membership Pending

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