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Emergent dynamics and phase behavior of interacting ellipsoid micro-swimmers[1] ENKELEIDA LUSHI, Brown University — Suspensions of self-propelling ellipse particles are known to display distinct phases depending on the density and particle aspect ratio: dilute gas, jammed state, swarms, bionematic state, turbulence or lanes. Each of these non-equilibrium phases exhibits distinct characteristics. Recent studies on the other hand have shown that the dynamics observed in bacterial suspensions can be better explained when accounting also for the disturbance fluid flow generated by the swimmers and their interactions through it. Using numerical simulations, we show that including the fluid interactions in the dynamics of ellipse motile particles modifies the system dynamics, e.g. the clustering of the swimmers and other physical characteristics. We show that the phase state diagram is significantly altered depending on the type of swimmer ("pusher" or "puller" vs. "mover") as well the swimmer density and aspect ratio.

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