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Phase transition of active rotors due to passive particles KYONGMIN YEO, IBM T J Watson Res Ctr, ENKELEIDA LUSHI, PETIA VLAHOVSKA, Brown University — We study the emergent collective dynamics of active suspensions of micro-rotors due to passive, tracer particles. The active suspensions consist of the 50:50 mixture of the opposite-spin rotors together with the passive particles. In the active suspensions, the rotational kinetic energy of the active rotors is converted to the translational kinetic energy (TKE) of the suspended particles. At low rotor densities, TKE of the passive particles is smaller than TKE of the active rotors. However, at higher rotor densities ($\phi_R \geq 0.16$), TKE of the passive particles becomes larger than the active rotors. Depending on the densities of the active rotors and the passive particles, the microstructures of the active rotors change from the doublet of opposite-spin rotors to the phase-separated flows. When both ϕ_R and ϕ_P are high, two large counter-rotating vortices emerge, while the passive particles move along the boundaries of the vortices. It is found that the mean-square displacement of the passive particles become larger than that of the active rotors in the phase-separated fluid regime.

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