Pattern Formation in a Rotating Suspension of Non-Brownian Buoyant Particles

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This study examines concentration and velocity patterns observed in a horizontal rotating cylinder completely filled with a monodisperse suspension of non-Brownian buoyant particles. The unique patterns or phases are mapped by varying both the rotation rate and the solvent viscosity. Individual phases are identified using both frontal ($\theta$-$z$ plane) and axial ($r$-$\theta$ plane) views. Phase boundaries are compared to those obtained recently for suspensions of non-buoyant particles. Expressing the boundaries in terms of dimensionless parameters unifies the data for several samples at low rotation rates. When centrifugal force dominates, the behavior becomes quite different from previous studies.

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