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Dynamics of Axial Segregation in Granular Slurries: Influence of Viscosity, Aspect Ratio and Periodic Tilting explored via Parallel Experiments STANLEY FIEDOR, PAUL UMBANHOWAR, JULIO OTTINO, Northwestern University — Flowing granular matter tends to segregate when particle properties such as size or density vary. In partially filled rotating tumblers, particles segregate perpendicular to the axis of rotation (radial segregation). In longer tumblers, binary particle mixtures may also form bands which are alternately rich and lean in one component (axial segregation). This process is accelerated in wet granular systems. Performing experiments in parallel, we investigate the influence of the interstitial fluid viscosity, cylinder length at fixed radius, and periodic tilting on the formation and long term dynamics of the bands. Changing the viscosity produces the most dramatic results: band formation time decreases with increasing viscosity and asymptotes for viscosities greater than about 4 cS, but the number of bands is maximized for a viscosity of approximately 3 cS. Surprisingly, periodic rocking of the cylinder at the rotation frequency does not influence band formation or long term dynamics even with maximum displacements of twice the tumbler radius.

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