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Granular convection in a spherical tumbler[1] ZAFIR ZAMAN, Northwestern University, UMBERTO D'ORTONA, Université Aix-Marseille, CNRS, JULIO M. OTTINO, RICHARD M. LUEPTOW, Northwestern University — We have performed DEM simulations and experiments for monodisperse particles in partially-filled spherical tumblers to better understand the flow of bidisperse particles in spherical tumblers, which display segregation patterns that result from differential axial migration of the two species. Particle tracking in DEM simulations for a 30% full tumbler suggests that there is a convection pattern in the monodisperse system that could play a role in the bidisperse system. Particles near the surface of the flowing layer move slowly toward the poles while particles lower in the flowing layer move toward the equator. The convection is quite slow, taking O(100) passages through the flowing layer to complete one convection orbit. Experiments in an 8 cm diameter spherical tumbler with 1 mm monodisperse particles having a band of particles of a different color confirm the convection pattern.

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Richard M. Lueptow
Northwestern University

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