Abstract Submitted
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**Granular dynamics of the low fill regime in a cylindrical tumbler: particle-wall slip**[1] DENNIS IVAN W. DIAZ, PAUL B. UMBANHOWAR, JULIO M. OTTINO, RICHARD M. LUEPTOW, Northwestern University — Investigations of granular flow in tumblers generally avoid low fill fractions due to the absence of a well-defined flowing layer and the high amount of slip between particles and the tumbler wall. Motivated by results from spherical and double-cone tumblers that exhibit slow axial drift and shallow layers near the "poles," we explored the low fill fraction regime using video analysis to track the particle motion. Large angular amplitude slip occurred at low fill levels and rotation rates. As fill level was increased, the mean time between slip events decreased as did the slip amplitude until, above a critical fill level, particle-wall slip effectively ceased. The mean time between slip events at fixed fill level was reduced by both increasing the tumbler rotation rate and decreasing the particle diameter. We use our results to evaluate the relationship between particle-wall slip and formation of a flowing layer.

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