

Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Subsurface Flow Structure in Rotating Tumblers RICHARD M. LUEPTOW, PENGFEI CHEN, JULIO M. OTTINO, Northwestern University — Granular flow in a rotating tumbler is altered near the endwalls, which is thought to be closely related to mixing and axial segregation near endwalls. Using the discrete element method, we compare the flowing layer for half-full 3D and quasi-2D tumblers containing particles with a monodisperse distribution. Results indicate that the flowing layer structure and velocity field at the center of a long tumbler differ from those near the endwalls. Furthermore, the flow is faster in a quasi-2D tumbler, but the flowing layer is not as deep. In 3D tumblers, endwalls introduce higher streamwise and transverse velocity fluctuations near the endwalls, but limit axial fluctuations. The axial flow near the endwalls is localized and independent with the length of the tumbler for long tumblers, but the axial flow regions associated with the endwalls interact with each other in short tumblers.

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Date submitted: 03 Aug 2007

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