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Macroscopic Characteristics of Unsteady Granular Flows in Rotating Tumblers DANIEL PAPROCKI, Northern Illinois University, NICHOLAS POHLMAN, Northenr Illinois University — Flow of silicate beads in rotating tumblers of triangular cross-sections are explored with respect to transient response of macroscopic properties. High-speed digital images are synchronized to tumbler orientation through an in-line rotary encoder. Image processing toolboxes are utilized to generate quantitative data for analysis. Time-dependent properties of free surface length, flowing layer curvature, and dynamic angle of repose are reported. The correlation of these properties with the orientation exhibits a phase difference that is a function of tumbler dimensions and fill fraction. Concurrent measurements of input energy to the system may lead to control algorithms to generate steady flow in inherently unsteady systems that would improve efficiency of granular transport methods.

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