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An investigation of granular rheology using Positron Emission Particle Tracking

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Abstract content
 (Max 300 words)
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We consider the rheological drivers of granular flows comprising mono-sized (5 mm) glass beads in a 300 mm diameter rotating drum operated in the cascading-to-cataracting Froude regime. By combining the inherent frictional nature of particles within a dense flow regime and noting that industrial rotating drums (tumbling mills) are typically characterised by collisional and turbulent stresses, a theoretical expression of the effective friction coefficient is derived, yielding a customised granular rheology for athermal, free surface granular flows. The input data to the model (velocity, solids concentration, pressure and flow depth) are obtained directly from non-invasive measurement using a nuclear imaging technique: Positron Emission Particle Tracking (PEPT). Using the new rheology, we derive the in-situ power dissipation and show that shear stresses drive the energy dissipation in the tumbling mill.

Apply to be considered for a student award (Yes / No)?

Yes

Level for award (Hons, MSc, PhD)?

PhD

Main supervisor (name and email) and his / her institution

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Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

Yes

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