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An investigation of granular rheology using Positron Emission Particle Tracking

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**Abstract content (Max 300 words)
Formatting &
Special chars**

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
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 Proceedings (Yes / No)?**

Yes

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