Contribution ID: **56** Type: **Oral Presentation**

Granular Flow Modelling of an Annular Shear Cell

Wednesday, 9 July 2014 11:10 (20 minutes)

Abstract content
   (Max 300 words)
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An investigation into the relationship between shear rate, shear stress and dispersive pressure within the simple couette geometry of an annular shear cell is presented here. In independent research it has been concluded that shear and normal stresses vary quadratically with shear rate and that the dispersive pressure is approximately three times the shear stress. The shear stress and (centrifugally driven) dispersive pressure distributions are constructed for the simple shear cell. The time-averaged physical ingredients of the stresses are obtained directly from Discrete Element Method (DEM) computational simulations and non-invasive measurements using a nuclear imagining technique: Positron Emission Particle Tracking (PEPT). However, viscous dissipation heating is notable in typical grinding shear cells. In order to capture this degradation of mechanical energy, while maintaining the simplicity of an isothermal formulation, the dispersive term in the mechanical energy balance equation is expanded to incorporate heat dissipation by increasing the proportionality constant between dispersive pressure and shear stress.

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Main supervisor (name and email)
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Session Classification: Applied

Track Classification: Track F - Applied Physics