

SAIP2014



Contribution ID : 86

A PEPT study of the quadratic en masse granular flows in rotating drums

Wednesday 09 Jul 2014 at 17:10 (01h50')

Abstract :

There has been a considerable amount of work done in understanding the flow of granular material in a rotating drum fitted with radial baffles. Aimed at mathematically deducing the S-shape of the flowing layer, the usual approach assumes that the material in the rising en-masse region flows like a plug and thus follows a linear velocity profile. Positron Emission Particle Tracking (PEPT) measurements of the trajectory fields in this region suggests a non-linear velocity field. We report on an extensive experimental program aimed at elucidating the velocity field in the presence of radial baffles. Without the motivation to calculate the shape of the free surface (we measure it), a simple granular flow model is built from the idea that this non-linearity in the velocity profile results from solid friction between the granules caused by the buildup of hydrostatic pressure and a granular viscosity that appears to originate from an angular momentum interpretation of grain dynamics. Applied Physics Group, Department of Physics, Centre for Minerals Research, University of Cape Town, P/Bag Rondebosch, 7701

Award :

Yes

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MSc

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Paper :

Yes

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Session classification : Poster2

Track classification : Track F - Applied Physics

Type : Poster Presentation