Abstract Submitted
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Anisotropy in rotating drums[1] TIMOTHY POVALL, Department of Physics, University of Cape Town, ANDREW MCBRIDE, Centre for Research in Computational and Applied Mechanics, University of Cape Town, INDRESAN GOVENDER, Department of Physics, University of Cape Town — An anisotropic relationship between the stress and the strain rate has been observed in two-dimensional simulations of rotating drums.[2] The objective of this work is to investigate the structure of the constitutive relation using three-dimensional discrete-element-method simulations of a rotating drum containing identical rigid spheres for a range of rotational speeds. Anisotropy is quantified from the alignment of the stress and strain rate tensors, with the strain rate computed using a least-squares fit.[3] It is shown that in certain regions there is a strong anisotropic relationship, regardless of the speed of rotation. The effective friction coefficient[4] is examined in order to determine the phase space in which the $\mu(I)$ rheology is valid. Lastly, a depth-averaged approach through the flowing layer is employed to determine the relationship between the velocity tangential to the equilibrium surface and the height of the flowing layer. A power-law relationship that approaches linear at high speeds is observed.

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[2]P.-P. Cortet et al., EPL, **88**, 2009
[3]C.H. Rycroft et al., JMPS, **57**, 2009
[4]Jop et al., Nature, **441, 2006**

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