

Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Applications and limitations of a rheology for granular flows

CHRIS CAWTHORN, JOHN HINCH, HERBERT HUPPERT, Department of Applied Mathematics and Theoretical Physics, University of Cambridge — In order to assess the validity of the rheological law for granular flows proposed by Jop, Pouliquen and Forterre [Nature, vol. 441, pp.727-730], we present its application to a number of different problems. Whilst it works well for steady flow on a confined sandpile, or in an inclined channel, we will show that the law fails to qualitatively predict flow some simple geometries, such as annular Couette flow and vertical chute flow. In addition, we consider perturbations to 2D flow on an inclined plane and 3D flow in an inclined channel, where the effect of the confining vertical walls becomes important. Implications for the use of Jop's rheology for more complicated problems, particularly those involving dam-break or column collapse will also be addressed.

Chris Cawthorn
Department of Applied Maths and
Theoretical Physics, University of Cambridge

Date submitted: 04 Aug 2007

Electronic form version 1.4