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A new rheology for dense granular flows PIERRE JOP, YOEL FORTERRE, OLIVIER POULIQUEN, IUSTI, Universite de Provence, CNRS UMR 6595, 5 rue Enrico Fermi, 13453 Marseille cedex 13, France, GEP TEAM — Recent experiments and numerical simulations of dry and dense granular flows suggest that a simple rheological description, in terms of a shear rate dependent friction coefficient, may be sufficient to capture the major flow properties [1,2]. In this work we generalize this approach by proposing a tensorial form of this rheology leading to 3D hydrodynamic equations for granular flows. We show that quantitative predictions can be obtained with this model by studying the flow of grains on a pile confined between two lateral walls. In this configuration we have experimentally measured the free surface velocity profile, the flowing thickness for different flow rates and channel widths. The results are compared with numerical simulations of the hydrodynamic model and quantitative agreement is observed. This study strongly supports the relevance of the proposed rheology.

1. F. da Cruz, S. Emam, M. Prochnow, J.-N. Roux and F. Chevoir, cond-mat/0503682 (2005)
2. G.D.R. Midi, EPJE14 367-371 (2004)

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