Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

A friction model for packings of arbitrary shaped, non-convex bodies. DAMIEN HUET, Department of Mathematics, University of British Columbia, ANTHONY WACHS, Department of Mathematics, department of Chemical & Biological Engineering, University of British Columbia — Granular flows are present in nature and countless major industrial applications, and in most cases the shape of the particles involved is non-spherical or even non-convex. The non-sphericity and non-convexity of the particles play a tremendous role in the dynamics of the system. Therefore, developing and using reliable simulation tools is critical to accurately capture the actual behaviour of granular flows. In this work, we apply the smooth Discrete Elements Method (DEM) to study packings of arbitrary-shaped particles. In smooth DEM, the collision forces are computed explicitly with a contact model. The classical models are only valid until the system reaches a pseudo steady-state, in which particles are not able to reach a zero velocity. This numerical artifact eventually overpacks the system. Our contact model follows the approach of Costa et. al. (PRL E, 2015) and uses three spring-dashpot models: two in the translational direction and another one in the angular direction. We apply this friction model to non spherical and/or non-convex particles. We show that non-convex bodies are able to reach a pure static state. We also show that we are able to capture macroscopic properties, such as packing porosity, that agree well with experimental data.

Damien Huet
Department of Mathematics, University of British Columbia

Date submitted: 29 Jul 2019 Electronic form version 1.4