On the connection between particle aspect ratio and rolling resistance

Tordesillas, A.[(1)], Alonso-Marroquin, F.[(2)] and Wang, Y.C.[(2)]

(1) Micromechanics of granular media group, Department of Statistics and Mathematics, The University of Melbourne, Melbourne, Australia
email tordesi@ms.unimelb.edu.au
(2) ESSCC, University of Queensland, Brisbane, Australia
email fernando@esscc.uq.edu.au, wangyc@esscc.uq.edu.au

We use biaxial test simulations to establish the functional relationship between aspect ratio and rolling friction. Simulations with frictional, rice-like particles are compared to simulations with disks with frictional and rolling resistance. The effect of aspect ratio on the fluctuations at critical state are similar to the effect of rolling resistance: stress-drops result as a consequence of buckling of force chains. These events are accompanied by peaks of frictional dissipation and strong release of kinetic energy. The investigation of the stress-drop events allows us to gain a better understanding of earthquake nucleation. The interconnection between particle shape and rolling resistance is useful to develop new methodologies for micromechanical continuum formulations for fault gouges.