Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Anatomy of flow and jam of a two dimensional granular flow in a hopper[1] JUNYAO TANG, ROBERT BEHRINGER, PROCTER & GAMBLE COLLABORATION[2] — We seek an understanding of the physics of jamming for hopper flow using high speed spatio-temporal video data for photoelastic disks flowing through a two-dimensional hopper. We have found experimental support for the hypothesis that jamming events of granular flow in a hopper occur as a Poisson process. Through measuring the density field and stress distribution, we demonstrate that "dome-structured" stress chains affect the density and velocity fields, leading to the mean flow profile in the hopper. We also measure how jamming statistics depend on the orifice sizes and the wall angles of a hopper. By calculating stress fluctuations, we conclude that instead of the density field, the formation of localized force chain arches controls the jamming transition of granular flow in a hopper. These data are part of an IFPRI-NSF Collaboratory for comparing physical data and simulations.

[1]This work is funded by IFPRI (International Fine Particle Research Institute).
[2]Paul Mort

Junyao Tang
Duke Physics

Date submitted: 07 Nov 2011 Electronic form version 1.4