Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Jetting mechanisms of particles under shock wave acceleration: the role of force chains KUN XUE, Beijing Institute of Technology — The particle jetting phenomenon is widely observed in many problems associated with blast/shock dispersal of granular materials, although its origin is still unidentified. We carried out discrete element simulations of the shock dispersal of two-dimensional particle rings in order to extract the particle-scale evolution of the shocked rings in terms of the velocity profile and the force-chain networks. Initially the force chains distribute uniformly along the circumference, but after several dozens of microseconds, they disseminate into a handful of blobs which mainly consist of long linear or branched chains align with the radial direction. These blobs are separated by zones featuring relatively sparse force chains which take forms of short chains or small compact polygons. The radial-like force chains in blobs serves as the channels transferring the momentum from the inner layers to outer layers, resulting in fast moving blocks without appreciable velocity differences. By contrast, the shock energy in the zones with short force chains is largely dissipated among the particle collision. Thus particles in these zones lag behind those bound by strong force chains. The resultant heterogeneous velocity profile acts as the precursor of the ensuing particle jetting.

Kun Xue
Beijing Institute of Technology

Date submitted: 03 Dec 2015 Electronic form version 1.4