

Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Excitation of an acoustic pulse by an impulsive shear flow in a dusty plasma¹ BIN LIU, JOHN GOREE, Department of Physics and Astronomy, The University of Iowa, Iowa City, IA 52242, DUSTY PLASMA TEAM — A dusty plasma is a strongly-coupled plasma that contains micron-sized particles. These particles, also called dust particles, are highly charged by ambient plasma; they interact with each other, sustaining collective wave motion. Both longitudinal and transverse waves can in general be excited. Here we use an electrostatic three-dimensional (3D) simulation to reveal a wave excitation mechanism that is due to viscous heating. In the simulation, an impulsive force was applied to drive a shear flow motion with a sudden onset. After a delay, a longitudinal acoustic pulse wave was observed, propagating outwards from the edge of the flow. We found that the viscous heating due to shear motion can result in a brief localized rarefaction in the dust cloud, leading to the excitation of a longitudinal acoustic wave. The simulation parameters were motivated by the PK-4 instrument on the International Space Station (ISS).

¹Work was supported by NASA.

Bin Liu
The University of Iowa

Date submitted: 13 Jul 2017

Electronic form version 1.4