Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Shock Propagation in Dusty Plasmas by MD Simulations MATHIEU MARCIANTE, MICHAEL MURILLO, Los Alamos National Laboratory —

The study of shock propagation has become a common way to obtain statistical information on a medium, as one can relate properties of the undisturbed medium to the shock dynamics through the Rankine-Hugoniot (R-H) relations. However, theoretical investigations of shock dynamics are often done through idealized fluid models, which mainly neglect kinetic properties of the medium constituents. Motivated by recent experimental results,[1] we use molecular dynamics simulations to study the propagation of shocks in 2D-dusty plasmas, focusing our attention on the influence of kinetic aspects of the plasma, such as viscosity effects. This study is undertaken on two sides. On a first side, the shock wave is generated by an external electric field acting on the dust particles, giving rise to a shock wave as obtained in a laboratory experiment. On another side, we generate a shock wave by the displacement of a two-dimensional piston at constant velocity, allowing to obtain a steady-state shock wave. Experiment-like shock waves propagate in a highly non-steady state, what should ask for a careful application of the R-H relations in the context of non-steady shocks. Steady-state shock waves show an oscillatory pattern attributed to the dominating dispersive effect of the dusty plasma.

[1]N. P. Oxtoby, E. J. Griffith, C. Durniak, J. F. Ralph and D. Samsonov. Ideal Gas Behavior of a Strongly Coupled Complex (Dusty) Plasma. *Phys. Rev. Lett.* **111**, 015002 (2013).

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Date submitted: 11 Jul 2014 Electronic form version 1.4