

Abstract Submitted  
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**Observation of temperature peaks due to strong viscous heating in a dusty plasma flow**<sup>1</sup> JOHN GOREE, YAN FENG<sup>2</sup>, BIN LIU, The University of Iowa — Profound temperature peaks are observed in regions of high velocity shear in a 2D dusty plasma experiment with laser-driven flow [1]. These temperature peaks are attributed to viscous heating, which occurs due to collisional scattering in a shear flow. In most plasmas and other substances, viscous heating has long been known to occur, but the temperature peaks in the high-shear regions are usually difficult or impossible to observe. This is so because thermal conduction in most substances is so strong as to flatten the temperature peaks. Dusty plasmas, on the other hand, have a sufficiently high viscosity and a sufficiently small thermal conductivity that the temperature peaks are easily observed. We also measure the shear viscosity and thermal conductivity in the same experiment; this is done by fitting the measured profiles of flow velocity and temperature to the dust hydrodynamic equations for momentum and energy.

[1] Feng, Goree and Bin Liu, PRL 109, 185002 (2012) and PRE 86, 056403 (2012)

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