Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Slip-stick excitation and travelling waves excite silo honking NATHALIE VRIEND, KASIA WARBURTON, University of Cambridge, ELZE PORTE, Imperial College London — Industrial storage silos filled with PET-particles can create a sound upon discharge. The sound forms a nuisance for the environment when the structure starts to act as a loudspeaker and may ultimately result in structural failure. This work investigates the phenomenon experimentally—the deployment of a microphone, an accelerometer and high-speed imaging on a laboratory set-up reveal the driving mechanism for the structural resonance: stick-slip at the wall. Particle image velocimetry shows an asymmetric, upwards travelling wave (at 50 m/s) which contains the dynamic slip-region. The frequency of the mechanical motion of the grains is successfully correlated to the frequency of the emitted sound. Friction models are explored to describe and quantify the frictional interaction between the grains and the wall.

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Date submitted: 29 Jul 2016 Electronic form version 1.4