

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Sound of silo's: An experimental investigation into sound emissions from granular flows in a vertical tube ELZE PORTE, University of Twente & Imperial College London, MARC MASEN, Imperial College London, NATHALIE VRIEND, University of Cambridge, ANDRE DE BOER, University of Twente — When large storage silos containing granular material are discharged, a loud sound emits from the silo. The noise causes disturbances for people working on site and for nearby residential areas. Insufficient knowledge exists to solve the problem efficiently and adequately. An experimental study using a scaled silo setup shows that the particle flow dynamics and system characteristics are both actors in determining the occurrence of the sound and its frequency. The extensive use of frequency analysis provides new insights into the complexity of the related parameters. The particle flow and tube characteristics are manipulated by changing the outflow rate, bulk material, wall material, wall pressure and tube dimensions. Frequency analysis of the recorded sound shows that the frequency depends on both the externally forced parameter changes and internal changes during flow. The latter indicates that during the flow, characteristic properties such as the packing fraction and sound speed change. As a result, the frequency changes as well. However, the external parameters that are manipulated as an initial condition are equally important in describing the frequency response.

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Date submitted: 01 Aug 2015

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