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Adjusting Images of a Conical Bead Pile through Linear Transformations MELITA WILES, SUSAN LEHMAN, College of Wooster — A conical bead pile is a used to model a system to learn about the behavior of granular systems. The pile is a critical system of roughly 20,000 steel beads atop a circular base; each bead is 3 mm in diameter. The pile is driven by adding one bead at a time to the pile apex. Any bead drop could trigger an avalanche, which we define as any number of beads leaving the pile. In order to analyze the dynamic behavior of individual avalanches, an aerial view camera records each avalanche at least 50 beads in size. We feed these images into a MATLAB program that analyzes the movement or velocity of sections of the pile. Since the camera cannot be directly above the apex of the pile, but is somewhat offset, the images produced are slightly distorted, leading to relative shifts in the velocity data for different locations on the pile. We reprocess the images taken by the camera using linear transformations through a homography matrix. This process is applied to batches of distorted images through a Mathematica program that produces the ideal viewpoint images. The technique will allow us to accurately analyze the pile behavior and movement of the beads on the pile, regardless of where the beads are located.

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