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Solitary Wave Behavior in Grains in One Dimension COREY KIM, NCSSM/ Duke University — I observed the propagation of stress from one grain to the next when stacked in a vertical column. The grains that were used are made of a photoelastic material, which allows instantaneous visual evidence of the amount of stress at each point of each grain. An impulse was applied to the top of the granular system in the form of a plexiglas rod which was allowed to drop in free fall onto the grains. The process is recorded with a high-speed camera, capturing about three to six frames where the stress is still in the process of traveling through the observed grains. Based on the pictures taken, it is possible to quantify the force at each grain, and to model the stress propagation as a wave. I explored the theory that the stress travels as a solitary wave, which is said to have a constant velocity that is proportional to the amplitude. In this case, amplitude was controlled by the initial height of the impulse-applying rod.

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