

Parametric Instability in an Array of Interacting Magnets
Kevin F. Chen, Class of 2019

A material with strain-hardening behavior is one that becomes harder to deform as one deforms it; whereas a material with strain-softening behavior becomes *easier* to deform as one deforms the material. There exist many simple examples of strain-hardening materials, one of the most common being a spring, which becomes harder to compress as it is compressed. My research dealt mainly with granular chains with strain-hardening behavior, most simply modeled by a chain of masses connected to each other by springs. Other models exist, for example, an array of interacting magnets. The force exerted by compression or rarefaction of a spring is analogous to the magnetic attraction/repulsion forces between this array of magnets. While we no longer have physical materials exhibiting these behaviors, the forces are therefore still modeled correctly. This magnet experiment setup proves important for the latter sections of my work.

In our mass-spring chain model, this can be shortened to "we assume the mass of any mass in the chain and the spring constant of any spring are constant. The development of the interacting magnet array setup allows us to vary this stiffness while the system is in motion. The goal of this variation is to