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Emergent mechanics of bird nests.[1] NICHALAS WEINER, HUNTER KING, The University of Akron, YASHRAJ BHOSALE, MATTIA GAZZOLA, University of Illinois Urbana-Champaign — A bird nest is stable bulk material comprised of many individual sticks and, in the simplest case, contains no adhesives and is held together only through internal friction between the components. A lot of research has been done on similar aggregate structures of low aspect ratio components (grains, soil, etc.) in the field of granular materials, however, very little has been done in exploring the mechanics of aggregate materials made up of high aspect ratio components. We designed experiments to probe the stress-strain behavior of an artificial simplified nest, made up of ˜2500 homogeneous sticks of aspect ratios above 50. We are exploring how the internal structure (coordination number, contact slipping, etc.) of the material changes during loading and unloading cycles, as well as how the bulk stress strain behavior changes will different loading procedures. We are also creating a simulation model to match our system in the limited cases of different properties we can explore experimentally. Providing useful information that cannot be extracted easily from the experiment (force chains, contact point location, etc.). Initial results for the experimental system will be presented, as well as preliminary hypotheses for why the system behaves in the unique ways observed.

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