

Abstract Submitted  
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**Extensional Rheology of Granular Staples**<sup>1</sup> SCOTT FRANKLIN,  
Rochester Institute of Technology — Collections of U-shaped granular materials (e.g. staples) show a surprising resistance to being pulled apart. We conduct extensional stress-strain experiments on staple piles with vary arm/spine (barb) ratio. The elongation is not smooth, with the pile growing in bursts, reminiscent of intruder motion through ordinary and rod-like granular materials. The force-distance curve shows a power-law scaling, consistent with previous intruder experiments. Surprisingly, there is significant plastic creep of the pile as particles rearrange slightly in response to the increasing force. There is a broad distribution of yield forces that does not seem to evolve as the pile lengthens, suggesting that each yield event is independent of the pile's history. The distribution of yield forces can be interpreted in the context of a Weibullian weakest-link theory that predicts the maximum pile strength to decrease sharply with increasing pile length. From this interpretation arise length and force scales that may be used to characterize the sample.

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Scott Franklin  
Rochester Institute of Technology

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