Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

A Microstructural View of Burrowing with Roboclam KERSTIN NORDSTROM, University of Maryland, DAN DORSCH, Massachusetts Institute of Technology, WOLFGANG LOSERT, University of Maryland, AMOS WINTER, V, Massachusetts Institute of Technology — Roboclam is a burrowing technology inspired by *Ensis directus*, the Atlantic razor clam. The organism only has sufficient strength to burrow a few centimeters into the soil, yet razor clams dig to over 70 cm. The animal uses motions of its valves to contract and thereby locally fluidize the surrounding soil and reduce burrowing drag. Roboclam technology is valuable for subsea applications that could benefit from efficient burrowing, such as anchoring, mine detonation, and cable laying. We directly visualize the movement of soil grains during the contraction of Roboclam, using a novel index-matching technique along with particle tracking. We show that a previously developed mechanical theory for *E. directus* describes the size of the failure zone around contracting Roboclam, provided that the timescale of contraction is sufficiently large. We also show that the nonaffine motions of the grains are a small fraction of the motion within the fluidized zone, affirming the relevance of a continuum model for this system, even though the grain size is comparable to the size of Roboclam.

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Date submitted: 14 Nov 2013 Electronic form version 1.4