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Mechanical diffraction in a sand-specialist snake PERRIN E SCHIEBEL, JENNIFER M RIESER, ALEX M HUBBARD, LILLIAN CHEN, DANIEL I GOLDMAN, Georgia Institute of Technology — Limbless locomotors such as snakes move by pressing the trunk against terrain heterogeneities. Our laboratory studies of the desert-dwelling Mojave Shovel-nosed snake (*C. occipitalis*, ∼40cm long, N=9) reveal that these animals use a stereotyped sinusoidal traveling wave of curvature. However, this snake also encounters rigid obstacles in its natural environment, and the tradeoff between using a cyclic, shape controlled gait versus one which changes shape in response to the terrain is not well understood. We challenged individuals to move across a model deformable substrate (carpet) through a row of 6.4 mm diameter force-sensitive pegs, a model of obstacles such as grass, oriented perpendicular to the direction of motion. Instead of forward-directed reaction forces, reaction forces generated by the pegs were more often perpendicular to the direction of motion. Distributions of post-peg travel angles displayed preferred directions revealing a diffraction-like pattern with a central peak at zero and symmetric peaks at $\pm 19 \pm 3°$ and $41 \pm 5°$. We observed similar dynamics in a robotic snake using shape-based control. This suggests that this sand-specialist snake adheres to its preferred waveform as opposed to changing in response to heterogeneity.

Perrin Schiebel
Georgia Institute of Technology

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