Abstract Submitted
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High speed x-ray observation of a sand swimming lizard[1] DANIEL GOLDMAN, School of Physics, Georgia Tech, RYAN MALADEN, Bioengineering Program, Georgia Tech, YANG DING, School of Physics, Georgia Tech — We use high-speed x-ray imaging to reveal how a small (10 cm) desert dwelling lizard, the sandfish (*Scincus scincus*), swims within a granular medium, and how its locomotion is affected by the volume fraction ϕ of the media [2]. We use an air fluidized bed to prepare 0.3 mm glass beads (similar in size to desert sand) into naturally occurring loose ($\phi = 0.58$) and close ($\phi = 0.62$) packed states. On the surface, the lizard uses a standard diagonal gait, but once below the surface, the organism no longer uses limbs for propulsion. Instead it propagates a large amplitude single period sinusoidal traveling wave down its body and tail to propel itself at speeds up to ≈ 1 body-length/sec. For fixed ϕ the animal increases forward swimming speed v_f by increasing temporal frequency f. For fixed f, v_f is independent of ϕ, despite resistance forces that nearly double from loose to close packed states. Surprisingly, the greatest sandfish velocity (and f) occur in the close packed state.

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[2]Maladen et. al, Science, **325**, 314, 2009

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