

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Snakeskin tribology: How snakes generate large frictional anisotropy HAMIDREZA MARVI, JEFFREY STREATOR, DAVID HU, Georgia Institute of Technology — The limbless locomotion of snakes relies fundamentally upon friction. Snakes can adjust their spatial and temporal frictional properties in order to get friction anisotropies of around 2. Ventral scales play a major role in friction adjustment. In this combined experimental and theoretical study we measure the mechanical and frictional properties of snakeskin. We report the effect of substrate roughness and compliance on snake frictional anisotropy. We numerically model a snake scale interacting with an elastic rough substrate using contact mechanics. The scale is modeled as an isotropic rigid material attached to the body using a torsional spring. We find that the combined effect of the scales geometry and angle of attack leads to the scale high frictional anisotropy. Our results suggest that fabricating engineering surfaces such as artificial snakeskin with optimized geometry and orientation of scales will improve the efficiency of snake-like robots.

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Date submitted: 12 Dec 2011

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