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What's its wave? A 3D analysis of flying snake locomotion[1] ISAAC J. YEATON, GRANT A. BAUMGARDNER, TALIA M. WEISS, GARY NAVE, SHANE D. ROSS, JOHN J. SOCHA, Virginia Tech — Arboreal snakes of the genus *Chrysopelea* are the only known snakes to glide. To execute aerial locomotion, a snake jumps from a tree into the air while simultaneously flattening its body into an aerodynamically favorable shape. Snake gliding is distinguished by complex, three-dimensional body undulations resulting in a stable glide. However, these undulations have not been sufficiently characterized for a proper dynamical analysis. Here we ask, what is the body waveform employed during a glide, and how does this waveform enhance rotational stability? We report on recent glide experiments in which we recorded the three-dimensional body position during 8.5 m glides using a multi-camera motion-capture system. We quantify the body posture using complex modal analysis, which then serves as input in a variable-geometry rigid-body simulation of the snake while gliding. By separating the inertial and aerodynamic contributions in the equations of motion, we can now quantify the stability of the snake's 'gait'.

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