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Gliding flight in snakes: non-equilibrium trajectory dynamics and kinematics[1] JAKE SOCHA, Virginia Tech, KEVIN MIKLASZ, Stanford University, FARID JAFARI, PAVLOS VLACHOS, Virginia Tech — For animal gliders that live in trees, a glide trajectory begins in free fall and, given sufficient space, transitions to equilibrium gliding with no net forces on the body. However, the dynamics of non-equilibrium gliding are not well understood. Of any terrestrial animal glider, snakes may exhibit the most complicated glide patterns resulting from their highly active undulatory behavior. Our aim was to determine the characteristics of snake gliding during the transition to equilibrium. We launched "flying" snakes (*Chrysopelea paradisi*) from a 15 m tower and recorded the mid-to-end portion of trajectories with four videocameras to reconstruct the snake's 3D body position. Additionally, we developed a simple analytical model of gliding assuming only steady-state forces of lift, drag and weight acting on the body and used it to explore effects of wing loading, lift-to-drag ratio, and initial velocity on trajectory dynamics. Despite the vertical space provided to transition to steady-state gliding, snakes did not exhibit equilibrium gliding and in fact displayed a net positive acceleration in the vertical axis.

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