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Flying Snake Flight Performance: Role of Cross-sectional Shape and Orientation of Tandem Body Segments DANIEL HOLDEN, PAVLOS VLACHOS, Mechanical Engineering, Virginia Tech, JAKE SOCHA, Engineering Science and Mechanics, Virginia Tech — The "flying" snake (*Chrysopelea paradisi*) possesses one of the most dynamically complex gliding flight patterns found in nature. Unlike other airborne animals that possess wings or flaps, this species lacks appendages to aid in controlling its flight path and producing lift. While gliding, the snake undergoes a high-amplitude undulatory motion, during which it expands its ribs to double its body width so that its cross section mimics the shape of a thick airfoil with camber and leading and trailing edges. The goal of this study was to determine the aerodynamic forces produced by the snake and investigate the underlying fluid dynamics that give the snake its unique gliding and maneuvering capabilities. Two-dimensional force measurements and CFD simulations were performed on an anatomical model of the snake's cross section to determine the steady and unsteady lift and drag coefficients, as well as the vortex shedding characteristics. These results show that the lift and drag produced by the model is dependent on Reynolds number, angle of attack, and the orientation of upstream and downstream body segments. Several tandem model configurations produced significant increases in lift and decreases in drag.

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