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Does dragonfly's abdomen flexion help with fast turning maneuvers?[1] GENG LIU, CHENGYU LI, HAIBO DONG, Dept. of Mechanical and Aerospace Engineering, University of Virginia, FLOW SIMULATION RESEARCH GROUP TEAM — Dragonflies are able to achieve fast turning maneuvers during take-off flights. Both asymmetric wing flapping and abdomen flexion have been observed during the fast turning. It's widely thought that the asymmetric wing beats are responsible of producing the aerodynamic moment needed for the body rotation. However, the dynamic effect of the abdomen flexion is not clear yet. In this study, an integrated experimental and computational approach is used to study the underlying dynamic effect of dragonfly abdomen flexion. It's found that dragonfly abdomen tended to bend towards the same side as the body reorienting to. Quantitative analysis have shown that during take-off turning maneuver the abdomen flexion can modulate the arm of force by changing the position of the center of mass relative to the thorax. As a result, roll and yaw moments produced by the wing flapping can be enhanced. This work is supported by NSF CBET-1313217.

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