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Characterization of jellyfish turning using 3D-PTV[1] NICOLE XU, JOHN DABIRI, Stanford Univ — *Aurelia aurita* are oblate, radially symmetric jellyfish that consist of a gelatinous bell and subumbrellar muscle ring, which contracts to provide motive force. Swimming is typically modeled as a purely vertical motion; however, asymmetric activations of swim pacemakers (sensory organs that innervate the muscle at eight locations around the bell margin) result in turning and more complicated swim behaviors. More recent studies have examined flow fields around turning jellyfish, but the input/output relationship between locomotive controls and swim trajectories is unclear. To address this, bell kinematics for both straight swimming and turning are obtained using 3D particle tracking velocimetry (3D-PTV) by injecting biocompatible elastomer tags into the bell, illuminating the tank with ultraviolet light, and tracking the resulting fluorescent particles in a multi-camera setup. By understanding these kinematics in both natural and externally controlled free-swimming animals, we can connect neuromuscular control mechanisms to existing flow measurements of jellyfish turning for applications in designing more energy efficient biohybrid robots and underwater vehicles.

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