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The hydrodynamics of linear accelerations in bluegill sunfish, *Lepomis macrochirus*[1] TYLER WISE, ALEX BODEN, MARGOT SCHWALBE, ERIC TYTELL, Tufts University — As fish swim, their body interacts with the fluid around them in order to generate thrust. In this study, we examined the hydrodynamics of linear acceleration by bluegill sunfish, *Lepomis macrochirus*, which swims using a carangiform mode. Carangiform swimmers primarily use their caudal fin and posterior body for propulsion, which is different from anguilliform swimmers, like eels, that undulate almost their whole body to swim. Most previous studies have examined steady swimming, but few have looked at linear accelerations, even though most fish do not often swim steadily. During steady swimming, thrust and drag forces are balanced, which makes it difficult to separate the two, but during acceleration, thrust exceeds drag, making it easier to measure; this may reveal insights into how thrust is produced. This study used particle image velocimetry (PIV) to compare the structure of the wake during steady swimming and acceleration and to estimate the axial force. Axial force increased during acceleration, but the orientation of the vortices did not differ between steady swimming and acceleration, which is different than anguilliform swimmers, whose wakes change structure during acceleration. This difference may point to fundamental differences between the two swimming modes.

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