Kinematics of linear accelerations in fishes

Running title: Swimming acceleration kinematics

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Key words:

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**Acknowledgements**

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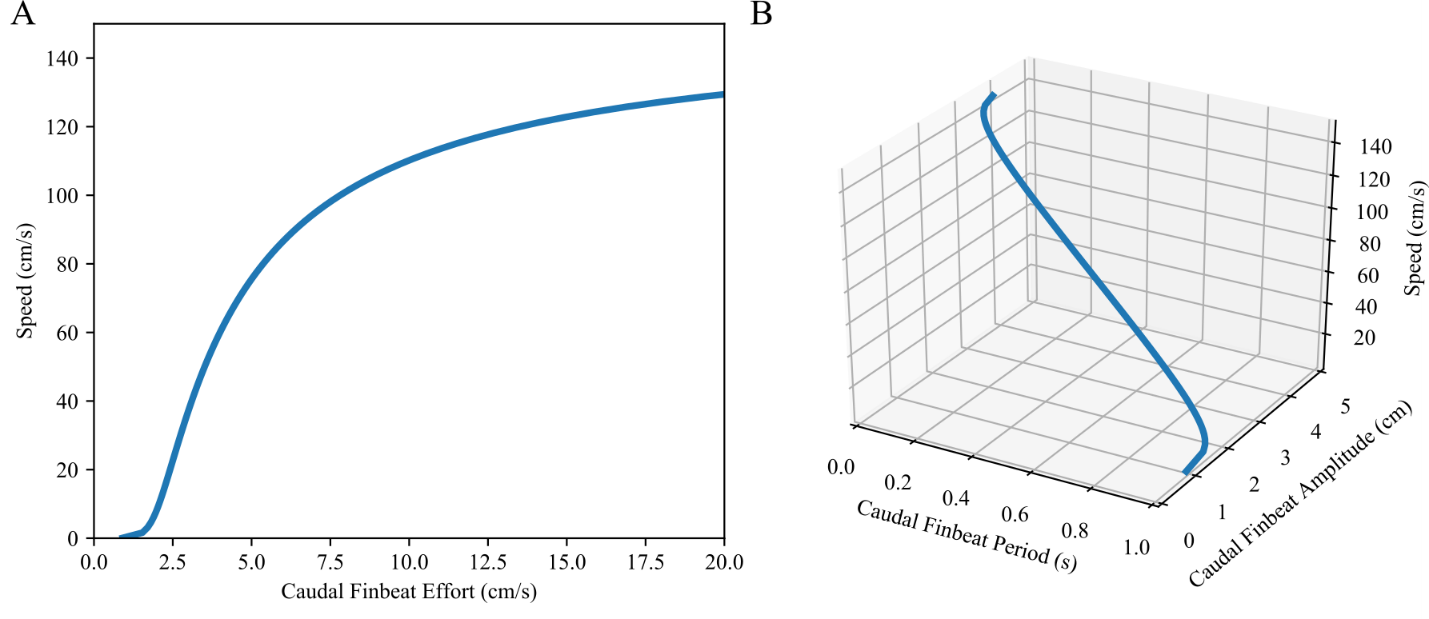
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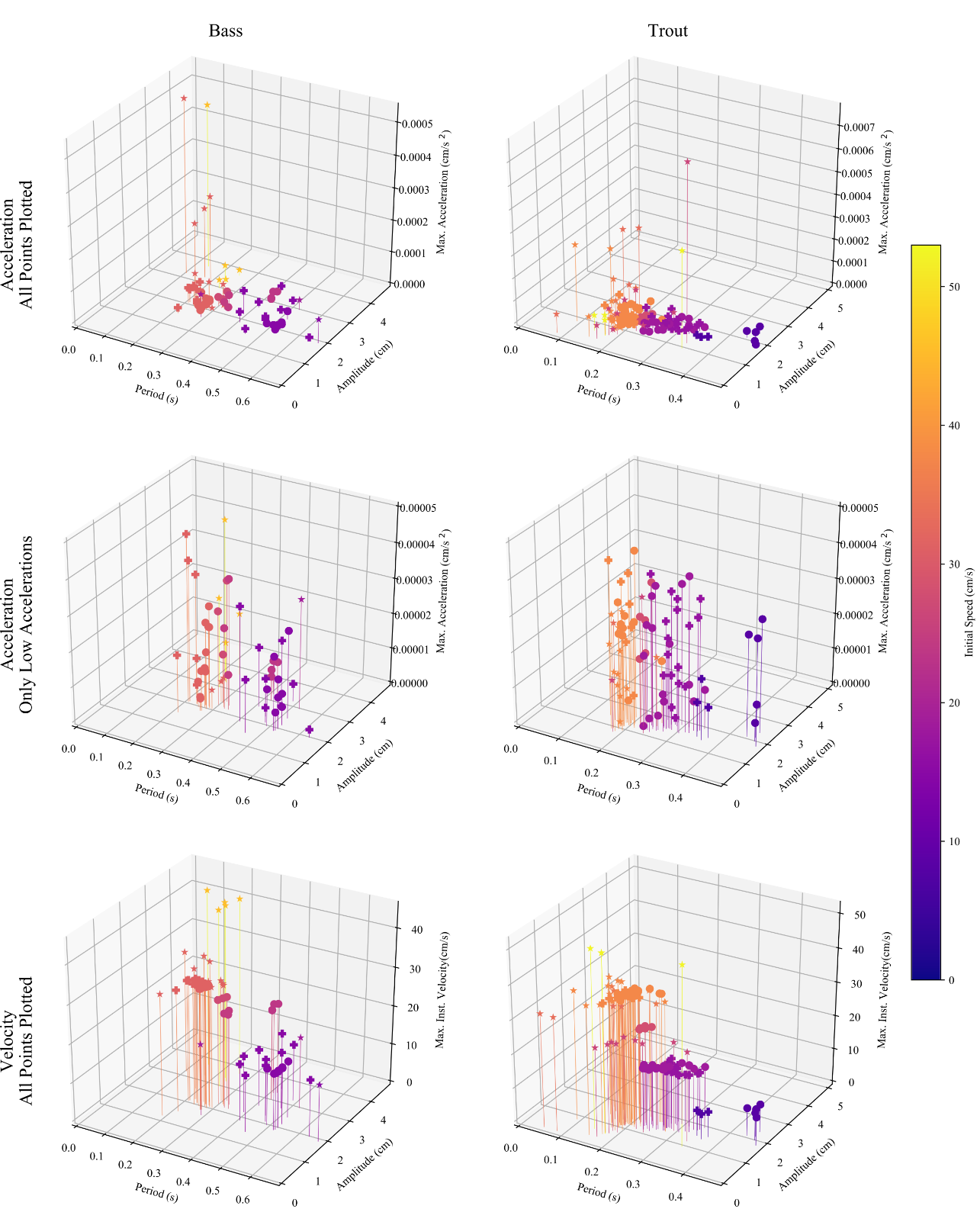
**References**

**Feilich, K. L.** (2017).

**Figures and Tables**

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**Figure 1. Schematic diagram with simulated data showing multiple kinematic pathways to accelerate to the same final acceleration, assuming only caudal fin propulsion**. A. Relationship between steady swimming speed and caudal finbeat effort as defined in Feilich, 2017. B. The relationship between period, amplitude, and speed. Data are simulated such that finbeat period has an inverse linear relationship with swimming speed, and amplitude has a sigmoidal relationship with speed. These hypothesized relationships are in keeping with the experimental observations that speed varies linearly with finbeat frequency (i.e. 1/period), and amplitude is mostly invariant with speed.



**Figure 2. Observed caudal finbeat kinematics for steady swimming, linear accelerations, and burst accelerations as encoded by the observer.** Left Column: Largemouth Bass (n=1, SL = , trials = ), Right Column: Trout (n = 2, SL = , trials = ). Top: All finbeats against maximum instantaneous acceleration. Middle: Finbeats with maximum instantaneous accelerations < 5x10-4 cm/s2, to show variation. Bottom: Finbeats against maximum instantaneous velocity. (Circles: steady swimming trials, +: linear acceleration trials, Star: burst acceleration trials). Points are colored by initial speed of trial.)