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Time-resolved Tomographic PIV Measurements of Water Flea Hopping: Body Size Comparison A.N. SKIPPER, Georgia Tech, D.W. MURPHY, Johns Hopkins University, D.R. WEBSTER, J. YEN, Georgia Tech — The flow field of the freshwater crustacean *Daphnia magna* is quantified with time-resolved tomographic PIV. In the current work, we compare body kinematics and flow disturbance between organisms of small (body length = 1.8 mm) versus medium (2.3 mm) versus large (2.65 mm) size. These plankters are equipped with a pair of antennae that are biramous such that the protopodite splits or branches into an exopodite and an endopodite. They beat the antennae pair synchronously to impulsively propel themselves, or 'hop,' through the water. The stroke cycle of *Daphnia magna* is roughly 80 ms in duration and this period is evenly split between the power and recovery strokes. A typical hop carries the daphniid one body length forward and is followed by a period of sinking. Unlike copepod escape motion, no body vortex is observed in front of the animal. Rather, the flow induced by each antennae consists of a viscous vortex ring that demonstrates a slow decay. The time-record of velocity (peak of 40 mm/s for the medium specimen) and hop acceleration (1.8 m/s^2 for the medium specimen) are compared, as well as the strength, size, and decay of the induced viscous vortex rings. The viscous vortex ring analysis will be presented in the context of a double Stokeslet model consisting of two impulsively applied point forces separated by the animal width.

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