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High-Speed Hopping: Time-Resolved Tomographic PIV Measurements of Water Flea Swimming D.W. MURPHY, D.R. WEBSTER, J. YEN, Georgia Tech — Daphniids, also known as water fleas, are small, freshwater crustaceans that live in a low-to-intermediate Reynolds number regime. These plankters are equipped with a pair of branched, setae-bearing antennae that they beat to impulsively propel themselves, or "hop," through the water. A typical hop carries the daphniid one body length forward and is followed by a period of sinking. We present time-resolved tomographic PIV measurements of swimming by *Daphnia magna*. The body kinematics and flow physics of the daphniid hop are quantified. It is shown that the flow generated by each stroking antenna resembles an asymmetric viscous vortex ring. It is proposed that the flow produced by the daphniid hop can be modeled as a double Stokeslet consisting of two impulsively applied point forces separated by the animal width. The flow physics are discussed in the context of other species operating in the same Reynolds number range of 10 to 100: sea butterfly swimming and flight by the smallest flying insects.

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