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Metachronal Propulsion, Hovering, and Signaling: High-Speed Tomographic PIV Measurements of Swimming Antarctic Krill J. YEN, D.W. MURPHY, D.R. WEBSTER, Georgia Tech — Antarctic krill (*Euphausia superba*) are pelagic crustaceans that must swim continuously to avoid sinking. Krill swim by beating their five pairs of swimming legs (known as pleopods) in a metachronal pattern. Although metachrony is a common propulsion technique among crustaceans, the hydrodynamics of multiple appendages paddling in series has not been well investigated. Furthermore, the hydrodynamic signal created by the metachronally stroking pleopods is thought to play a role in schooling propensity among krill conspecifics. We present time-resolved tomographic PIV measurements of the flow generated by free-swimming Antarctic krill. Detailed flow measurements around the pleopods of a hovering Antarctic krill reveal flow being drawn backwards with each pleopod stroke in this drag-based swimming technique. Vortices forming around each pleopod pair during the power stroke also were found and may create additional thrust. Measurements in the wake of the krill reveal a pulsed jet flow with mean and oscillatory components. This wake signature may form a communication channel with nearby conspecifics and is discussed in the context of sensory ecology.

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