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PIV Measurements of Tethered and Free-swimming Copepodid Flow Fields K.B. CATTON, D.R. WEBSTER, J. BROWN, J. YEN, Georgia Tech — Accurately visualizing and quantifying the flow field created by copepod movement is important for understanding ecological processes such as feeding and hydrodynamic signal detection. Copepods used in studies addressing these issues are often tethered at a fixed location to simplify experiments and reduce data collection time. In this study, we compared the flow field generated by tethered and free-swimming *Euchaeta antarctica* using the particle image velocimetry (PIV) technique. The tethered copepodid flow field contained asymmetrical regions of high velocity, higher maximum velocities, and a greater rate of kinetic energy dissipation compared to the free-swimming copepodid flow field. The differences in the flow field are explained by considering the forces on the free swimming specimen compared to the tethered specimen. Viscous flow theory demonstrates that the force on the fluid due to the presence of the tether irrevocably modifies the flow field in a manner that is consistent with the measurements. Due to the differences in the flow field, calculations of biological quantities, such as energetic costs, filtering rates, and the volume of fluid influenced by zooplankton, differ for tethered versus free-swimming (natural) conditions.

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