Abstract Submitted for the DFD07 Meeting of The American Physical Society

On the hydrodynamics of planktonic microcrustacean locomotion: Numerical simulations and experiments<sup>1</sup> IMAN BORAZJANI, FOTIS SOTIROPOULOS, University of Minnesota, EDWIN MALKIEL, JOEPH KATZ, Johns Hopkins University — We develop a sharp-interface immersed boundary method for carrying out highly resolved simulations of the flow induced by a selfpropelled copepod and integrate the simulations with high-resolution experiments to elucidate some aspects of the hydrodynamics of copepod swimming. A realistic copepod-like body is constructed, which includes most important parts of the animal's anatomy: the antennules, legs, and tail. The kinematics of the individual body appendages during an escape maneuver are prescribed based on data obtained using cinematic digital holography. The self-propelled motion of the copepod induced by the prescribed kinematics is simulated via a strongly-coupled fluid-structure interaction approach. The computed flowfields are compared with experimental results and analyzed to elucidate the structure and dynamics of the coherent wake vortices and quantify the specific contribution of each appendage on the production of propulsive thrust.

<sup>1</sup>This work was supported by NSF grant 0625976 and the Minnesota Supercomputing Institute.

Iman Borazjani

Date submitted: 08 Aug 2007

Electronic form version 1.4