

Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Velocity Measurements of a Pistol Shrimp's Micro Water Jet Using High Speed PIV J. TORRES, K. WASHINGTON, S. WONG, M. ZARZECKI, Y. CHENG, F.J. DIEZ, Rutgers, The State University of New Jersey — The pistol shrimp generates a high speed micro water jet that was studied experimentally using time resolved particle image velocimetry. The pistol shrimp, with an average size of about 5.5 cm, is considered to be one of the loudest animals in the world. The sound generated can reach intensity levels as high as 200 db. In the past, it was believed that the loud noise was produced by the shrimp closing its claws. Recent research has revealed that the sound is actually generated by a bubble that is created when the claw is shut. The generated bubble is followed by a micro jet. This process is used by the shrimp to stunt and attack preys and to defend itself. In this cavitation process, the bubble is created by a sudden drop in pressure as the claw closes at speeds of 100 km/hr. The temperature inside the bubble can range from 5,000 to 10000 degrees Kelvin and generates infrared light. This whole process is estimated to last around 300 microseconds. The phenomenon of the bubble itself is believed to take at most 10 nanoseconds. This research focuses in visualizing the bubble and the micro jet produced during the closing of the claw and characterizing the velocity field generated by the micro jet by taking PIV images at a rate of up to 40,000 frames per second.

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Date submitted: 08 Aug 2007

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