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Rebecca Segal*, rasegal@vcu.edu, and **Wanda Strychalski, Sarah Bryant, Baasansuren Jadamba, Eirini Kilikian, Xiulan Lai, Leili Shahriyari, Ning Wei and Laura Miller. *Fluid Dynamics of Nematocyst Prey Capture.***

A nematocyst is a specialized organelle within cells of jellyfish and other Cnidarians that sting. Nematocysts are also present in some single-celled protists. They contain a barbed, venomous thread that accelerates faster than almost anything else in the animal kingdom. Here we simulate the fluid–structure interaction of the barbed thread accelerating through water to puncture its prey using the 2D immersed boundary method. For simplicity, our model describes the discharge of a single barb harpooning a single-celled organism, as in the case of dinoflagellates. One aspect of this project that is particularly interesting is that the micron-sized barbed thread reaches Reynolds numbers above one, where inertial effects become important. At this scale, even small changes in speed and shape can have dramatic effects on the local flow field. This suggests that the large variety of sizes and shapes of nematocysts may have important fluid dynamic consequences. We find that reaching the inertial regime is critical for hitting prey over short distances since the large boundary layers surrounding the barb characteristic of viscous dominated flows effectively push the prey out of the way. (Received September 09, 2019)