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Fluid Dynamics of Ballistic Strategies in Nematocyst Firing CHRISTINA HAMLET, Bucknell University, WANDA STRYCHALSKI, Case Western Reserve Univeristy, LAURA MILLER, University of North Carolina at Chapel Hill — Nematocysts are stinging organelles used by members of the phylum Cnidaria (jellyfish, anemones, hydra) for capturing prey and other important functions. Nematocysts are some of the fastest-known accelerating structures in the animal world. As such their rapid accelerations and small scales complicate resolving some aspects of their firing mechanism. We present results from mathematical models implemented in an immersed boundary framework that capture some of the dynamics of a a barb-like structure accelerating a short distance across a range of Reynolds numbers towards a passive target. Results indicate that acceleration and then coasting is not sufficient for a nematocyst to reach its target. We discuss the implications of these results for mechanisms required for small-scale ballistics.

Christina Hamlet
Bucknell University

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