

Abstract Submitted
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Cruise Speed Characteristics of a Self-Propelled Pulsed-Jet Underwater Vehicle¹ ALI MOSLEMI, JUSTIN NICHOLS, Graduate student(SMU), PAUL KRUEGER, Assistant Professor(SMU) — Steady-jet propulsion has been widely used for air and marine vehicles. This system has a high propulsive efficiency for high vehicle velocities, but it ceases to be efficient as the vehicle velocity or Reynolds number (Re) decreases. One alternative for low Re propulsion is pulsed-jet propulsion similar to that utilized by squid and jellyfish. We have developed a self-propelled pulsed-jet underwater vehicle (“Robosquid”) to investigate the effectiveness of pulsed-jet propulsion as Re decreases. A piston-cylinder mechanism is used for generating pulsed flow. The system allows control of piston velocity program, pulsing frequency, and piston stroke-to-nozzle diameter ratio (L/D). In this preliminary study, the effects of L/D and time-averaged jet mass flow rate on the vehicle cruise speed are investigated. The results for cruise speed are presented for $L/D = 3, 5, \dots, 15$ at the same mass flow rate and increasing mass flow rate at the same L/D . The vehicle Re varied from 12000 to 14000 and results show that the mass flow rate is a dominant factor in vehicle cruise speed.

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