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Effect of Vehicle Configuration on the Performance of a Submersible Pulsed-Jet Vehicle at Intermediate Reynolds Number[1] P.S. KRUEGER, J.T. NICHOLS, SMU — Recent results have demonstrated that pulsed jet propulsion can achieve propulsive efficiency greater than that for steady jets when short, high frequency pulses are used, and the pulsed-jet advantage increases as Reynolds number decreases into the intermediate range ($\sim$50). An important aspect of propulsive performance, however, is the vehicle configuration. The nozzle configuration influences the jet speed and, in the case of pulsed-jets, the formation of vortex rings with each jet pulse, which have important effects on thrust. Likewise, the hull configuration influences the vehicle speed through its effect on drag. To investigate these effects, several flow inlet, nozzle, and hull tail configurations were tested on a submersible, self-propelled pulsed-jet vehicle ('Robosquid' for short). In terms of propulsive efficiency, changing between forward and aft-facing inlets had little effect, but changing from a smoothly tapered aft hull section to a blunt tail increased propulsive efficiency slightly due to reduced drag for the blunt tail configuration at intermediate Re. Sharp edged orifices also showed an advantage over smooth nozzles.

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