

Abstract Submitted
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Maneuver Control of an Undulating-Fin Underwater Vessel with a Central Pattern Generator¹ ALBERT ESPINOZA, Universidad Ana G. Mendez - Gurabo, GONZALO GARCIA, OSCAR CURET, Florida Atlantic University — Undulating fin propulsion for underwater vehicles provides key advantages over traditional propeller-based methods, including increased maneuverability and high efficiency at low speed. However, some of the challenges of controlling the motion of the vessel using an undulating fin propulsion are the high coupling of the propulsive forces and torques, and the extensive parameter space of the propulsive surface. In this work, we implemented a Central Pattern Generator (CPG) to control the fin and provide a smooth transition between rapidly-changing fin wave control commands. We developed a numerical model of an underwater vehicle propelled by a single undulating fin equipped with a central pattern generator to control the swimming motion and perform different maneuvers. The model includes a 6 degree-of-freedom motion of the vessel and a discretized hydrodynamic model of the fin. This model was used to study the effects of CPG dynamics on vessel response for different swimming modes, including straight line and forward-reverse motion. The results were compared to experiments using a robotic underwater vessel.

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