The Design and Prototyping of the Multipurpose Autonomous Underwater Vehicle for Coastal Research

Raymond Turrisi[1] & Mingxi Zhou[2]

[1]Mechanical Engineering, University of Rhode Island, Kingston, RI
[2]Graduate School of Oceanography, University of Rhode Island, Narragansett, RI

As interests in the ocean and climate change have grown in recent years, the advancements in Autonomous Underwater Vehicles have made great progress and have made their way into many fields to adopt a wide range of military applications and oceanographic research in coastal and offshore waters. While any AUV's are very niche and expensive, we focused on designing the Multipurpose AUV (MAUVe) to be used in a vast range of applications. Beyond horizontal cruising, the MAUVe will be capable of hovering and vertical diving/climbing providing high-resolution water column measurements.

The MAUVe is designed to be less than 2 meters long with an outer diameter of 6 inches. The vehicle is designed to be one-man portable with a total weight less than 20 kilograms. In order to meet different mission requirements, the MAUVe is featured with two internal actuators, one linear mass slider and one mass rotator, to reposition the center of gravity relative to the center of buoyancy, and a pair of tilt-thrusters.

In this conference, we will focus on presenting the tilt-thruster design and prototyping. This unique tilt-thruster design features two through-housing magnetic couplings, folding propellers, and two adjustable NACA foils. This allows the thruster to reliably operate at a high RPM mitigating dynamic o-ring failure, propellers that are more resilient to obstacles and maintain a low profile when coasting. Currently, we are improving multiple aspects of the design, and thruster characterization is expected to be conducted in the coming Fall in the water tank at the department of Ocean Engineering. The MAUVe will primarily serve as a flexible and easy to reproduce research platform for future graduate students, post-doctoral studies, as well as commercial and military use.

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