

Ethan Hahn

Senior Division Engineering

Design and Construction of a Silent Magnetohydrodynamic Propulsion System

The purpose of this experiment was to build an MHD propulsion system that makes, at most, 10% of the noise of the current model. The thruster was also designed so that it has no consumable fuel, except for water and electricity, and emits nothing that would be easily detectable by modern day marine sensing equipment. The thruster was constructed out of plexiglass, which contained stainless steel electrodes and NdFeB magnets, and had an activated carbon filter on the output. I also built a vacuum distillation apparatus consisting of a standard distillation system connected to a vacuum pump. A zinc iodide recycling system was also necessary. Lastly, a vacuum transfer system was constructed from a low power vacuum pump and some flasks to transfer the solution throughout the machine. When the thruster was tested in salt water, it produced 4cm/sec of thrust and 34.4 db. of noise. When it was tested in the zinc iodide solution, it produced 3.5cm/sec of thrust and 0.0 db. The vacuum distillation system produced 10ml of pure water every minute. The original activated carbon filter captured 98.0% of the zinc and iodine, and a re-designed filter captured 99.5%. The test of the MHD system was an overall success. The thruster produced only .26% of the noise of the original system with moderately less thrust, because of the filter. The thrust could be increased with an increased concentration of zinc iodide. A reverse osmosis distillation system would have been able to keep up with the thruster output.
