World Academy of Science, Engineering and Technology
International Journal of Marine and Environmental Sciences
Vol:14, No:08, 2020

Hydrodynamic Analysis on the Body of a Solar Autonomous Underwater Vehicle by Numerical Method

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Abstract : In the case of Solar Autonomous Underwater Vehicle, which uses photovoltaic panels to provide its required power, due to limitation of energy, accurate estimation of resistance and energy has major sensitivity. In this work, hydrodynamic calculations by numerical method for a solar autonomous underwater vehicle equipped by two 50 W photovoltaic panels has been studied. To evaluate the required power and energy, hull hydrodynamic resistance in several velocities should be taken into account. To do this assessment, the ANSYS FLUENT 18 applied as Computational Fluid Dynamics (CFD) tool that solves Reynolds Average Navier Stokes (RANS) equations around AUV hull, and K-ω SST is used as turbulence model. To validate of solution method and modeling approach, the model of Myring submarine that it's experimental data was available, is simulated. There is good agreement between numerical and experimental results. Also, these results showed that the K-ω SST Turbulence model is an ideal method to simulate the AUV motion in low velocities.

Keywords : underwater vehicle, hydrodynamic resistance, numerical modelling, CFD, RANS
Conference Title : ICNAOE 2020 : International Conference on Naval Architecture and Ocean Engineering
Conference Location : Vancouver, Canada
Conference Dates : August 06-07, 2020