

Position control and stabilization of fully-actuated AUV using PID controller

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Abstract—this paper presents an inverse kinematic model for an Autonomous Underwater Vehicle (AUV) with 8 thrusters. The vehicle configuration allow the AUV to have a fully-actuated 6 Degrees of freedom (DOF). Rigid body dynamic model and water environment hydrodynamic model are used in this study. The model is implemented and tested using Matlab and Simulink. A 3D model of the AUV is designed for illustration in this work using Autodesk MAYA. Cascaded position and velocity control approach is studied. A conventional linear Proportional Integral Derivative (PID) controller is used for speed control and PD controller for the position control. Ocean current disturbances are introduced to test the system and control stability. Validation of the model is performed with tests for speed stabilization and position control with and without disturbances.

Keywords—MATLAB, Simulink, DOF, AUV, Fully-actuated, dynamic model, Kinematic model, PID, stabilization, position control, stability