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Small Unmanned Surface Vehicle in Autonomous Way-point Experiments and Simulations for Straight Path Tracker

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Abstract

The small unmanned surface vehicle (USV) in autonomous motion can be implemented in surveying applications and water management systems. In process of autonomous navigation, the precision of position and path-way are necessary for the operation. This research was aimed to investigate and track the path-way by using a perpendicular straight line error between way-point for small USV system. The kinematic and dynamical models are formulated and implemented in MATLAB® and Simulink programs. The investigations for autonomous way-point tests are divided into two main parts; experimental results used an ArduPilotMega(APM2.8) microcontroller board, and simulation results by using mathematical dynamic model. Both experiments are analyzed by using a tracking-error for the straight path, which can be described the mean and standard deviation values. The results will help to predict the tendency of error, while operating on the field tests. Moreover, this model can be applied to improve system identification as well as to enhance a controller design of a real unmanned surface vehicle.

Keywords*:* Unmanned Surface Vehicle(USV), Perpendicular Straight Line, ArduPilotMega(APM2.8), Tracking-error, Mean and Standard Deviation