عنوان مقاله:

A Simultaneous Position and Velocity Control of an Autonomous Underwater Vehicle

محل انتشار:

نوزدهمین همایش ملی و هشتمین کنفرانس بین المللی مهندسی ساخت و تولید ایران (سال: 1401)

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خلاصه مقاله:

This paper presents a simultaneous control approach for depth, sway and speed of an autonomous underwater vehicle (AUV) considering the control surface angle limits. To this end, at first the nonlinear kinematic and dynamic equations of motion for a ۶- Degrees of freedom (DOF) AUV is derived, and in order to verify the equations of motion and the robot's treatment in open-loop structure, the results of motion for Remus-۱۰۰ in the horizontal plane are compared with the results given in other references for this famous AUV type. Then, the simultaneous control of depth, sway and speed of the underwater vehicle is investigated and simulations are implemented in Matlab Simulink software. In this work, two conventional Proportional-Integral-Derivative (PID) controllers are used for inner-and-outer loops, i.e., pitch-and-depth control scheme, respectively, and two inner-and-outer PID controllers are also employed for yaw-and-sway control. Furthermore, a P controller is applied for the speed control of AUV. The results confirm that the proposed control scheme equipped with inner-and-outer loops having certain saturation conditions for the rudder and stern fins as actuators is not only capable of controlling the aforementioned combined motion of AUV but also yields the satisfactory performance in speed control.

کلمات کلیدی:

Autonomous Underwater Vehicle - ۶-Dof-Position Control - Velocity Control- Simulink.