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Identification and Control the Yaw Motion Dynamics of Open Frame Underwater Vehicle

Authors : Mirza Mohibulla Baig, Imil Hamda Imran, Tri Bagus Susilo, Sami El Ferik

Abstract : The paper deals with system identification and control a nonlinear model of semi-autonomous underwater vehicle (UUV). The input-output data is first generated using the experimental values of the model parameters and then this data is used to compute the estimated parameter values. In this study, we use the semi-autonomous UUV LAURS model, which is developed by the Sensors and Actuators Laboratory in University of Sao Paolo. We applied three methods to identify the parameters: integral method, which is a classical least square method, recursive least square, and weighted recursive least square. In this paper, we also apply three different inputs (step input, sine wave input and random input) to each identification method. After the identification stage, we investigate the control performance of yaw motion of nonlinear semi-autonomous Unmanned Underwater Vehicle (UUV) using feedback linearization-based controller. In addition, we compare the performance of the control with an integral and a non-integral part along with state feedback. Finally, disturbance rejection and resilience of the controller is tested. The results demonstrate the ability of the system to recover from such fault.

Keywords : system identification, underwater vehicle, integral method, recursive least square, weighted recursive least square, feedback linearization, integral error
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