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THRUSTER CONTROL BASED ON THE SHUNT DC MOTORS FOR A PRECISE POSITIONING OF THE MARINE VEHICLES

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ABSTRACT—The aim of the paper is the control of the number of revolutions developed by the shaft of a shunt direct current motor coupled to the stern propeller of an underwater vehicle with the purpose of controlling its horizontal orientation. Its dynamic can be expressed by two non linear decoupled equations. The procedure is based on the decomposition of the model with uncertainties by a suitable transformation onto a controlled subsystem and a stable non-controlled part, followed by the control design technique based in a sliding mode control algorithm using the backstepping theory, to achieve a controller capable to perform the fixed and tracking control purposes. The results show that the proposed procedure performs the control task satisfactory under uncertainties on the nonlinear model parameters. In the same way, once guaranteed the stability in order to satisfy the control requirements of efficiency and robustness, an error criteria have been applied. Validation of the control system is carried out by simulation.

Key Words: Electrical machines, Modelling, Nonlinear systems, Feedback linearization, Sliding mode control, Backstepping