ABSTRACT

This study aims to design and implement speed control on DC motors with an encoder using the Model Reference Adaptive Control (MRAC) on a hardware in the loop (HIL) system. Conventional controls such as PID controls are often still used in DC motor control applications, but have limitations in terms of complex control performance. Therefore, a more advanced control technique is used, namely the Model Reference Adaptive Control.

This research includes the design of a hardware system on a loop consisting of a DC motor plant, MRAC controller, and control display. In addition, trials were also carried out to test the performance control with sinusoidal reference signals and signal reference steps. The test results show that the MRAC control successfully follows the reference signal with a low Root Mean Squared Error (RMSE) value.

In conclusion, this study succeeded in designing a control on a DC encoder motor using the Reference Adaptive Control Model on the system hardware in a loop and was able to produce satisfactory results in testing. The results of this study can be used as an alternative control that is better than conventional controls for applications that require higher and more complex control performance.

Keywords **:** *DC Motor, Encoder, Hardware in The Loop, Model Reference Adaptive Control.*