

Abstract

Mostafa R Ahmed

Enhanced Electromechanical Brake-by-Wire System Using Sliding Mode Controller

The importance of the brake-by-wire (BBW) system emerged from the fact that it replaces all the conventional hydraulic braking system components with electronic signals between sensors, control modules, and electrically driven braking actuators. This conversion has enormously contributed to the braking system performance in terms of responsiveness, integration with other vehicle subsystems, and an adaptive behavior in different driving circumstances. The aim of this research is investigating the sliding mode control (SMC) strategy to a proposed BBW system. To achieve this aim, BBW system is modeled and validated experimentally. The SMC strategy is applied to the model and validated experimentally. Moreover, this research focuses on compensating for the effect of worn pads on braking performance. The experimental work shows that the developed system model gives matched results with the experimental work. Applying SMC to the model shows a good performance in breaking operation with acceptable error. Applying of the SMC to the test rig shows a good performance with acceptable deviations. In addition, the experiments show that the control strategy is able to compensate the wear in braking pads and keep tracking the braking command.