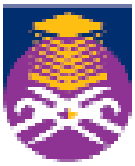

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Title : REAL-TIME DIGITAL TRACKING CONTROL OF ELECTRO-HYDRAULIC ACTUATOR USING TRAJECTORY ZERO PHASE ERROR TRACKING CONTROLLER

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The experimental equipment Quarter Car System was used in the studies of comfort riding. This system consists of a metal framework with hydraulic absorber attached to a tyre assembly. In comfort riding studies, the tyre will move up and down and the absorber has to sustain and stabilize the movements. For comfort riding, a control system was designed to control the movement of absorber and stabilized in shortest possible time. The movement of tyre up and down represents the road profile to test the robustness of the absorber controller. The tyre movements to represent the road profile can be done by a position control electro-hydraulic actuator (EHA) system which was placed in vertical position. The control movement of cylinder rod will represent the required road profile for comfort riding studies. By implementing conventional Zero Phase Error Tracking Control (ZPETC) to control the cylinder rod movement will only accurate for slow movement but not for fast movement. This is due to low frequencies and small bandwidth limitation. High frequency operation is not applicable. Thus, this research work proposed a new development and implementation of digital tracking control using feedforward trajectory ZPETC to the EHA system that will provide better control of cylinder rod to emulate road profile for low and high frequency movements. The plant model was represented by ARX331 structure and identified from the open-loop test experimental data. The proposed controller was designed using three different controllers based on three separated methods such as RLS method, comparing coefficients method and Laurent series method. Simulation results showed that the RLS method was capable to produce satisfactory tracking performance even with small filter-order. High filter-order was required to produce the same satisfactory tracking performance using the comparing coefficients method and Laurent series method. Using the same filter-order, Laurent series method produced better tracking performance than comparing coefficients method. The simulation results were validated using the real-time control of the EHA system using Matlab and Simulink environment.