

عنوان مقاله:

Speed and Direction Control Enhancement for Four-Wheel Drive System using Finite-Time Control

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خلاصه مقاله:

Over the past few years, many electrical vehicle manufacturers have focused on developing enhanced controller efficiency for Four-Wheel Drive (FWD) systems. The control of the speed and direction of the FWD is crucial for safe and efficient operation, particularly in challenging maneuvers. The FWD system movements in straight routes and during maneuvers, turning all four wheels right and left, have not been well covered. Therefore, a robust control design that is capable of controlling the FWD system at an optimal time of operation is highly required. In this research, a Finite Time Control (FTC) is designed, implemented, and simulated to improve the robustness and performance of the FWD system during challenging maneuvers. The proposed FTC controls both the speed and direction of all wheels of FWD according to the route situations. The proposed FTC is compared with an FWD system that is controlled by a traditional Proportional, Integral, and Derivative (PID) controller during straight moving and maneuvers. The comparison is based on controlling parameters such as settling time, maximum overshoot, and speed error values. The results showed that the proposed FTC has a much faster settling time, significantly less maximum overshoot, and much lower error values than the PID controller. These factors are considered the main features of the contribution of any controller system that aims for optimal and robustness and FTC proved to have them adequately.

کلمات کلیدی:

Four-wheel drive (FWD), Finite-Time Control (FTC), PID, Speed and Direction Control

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