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Performance Comparison Between Predictive Functional Control and PID Algorithms for Automobile Cruise Control System

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Abstract

This work presents a performance comparison between a Predictive Functional Control (PFC) and a traditional Proportional Integral Derivative (PID) controller specifically for a cruise control application. The tuning efficacy, constraints handling, and disturbance rejection features of both controllers are analysed by comparing their closed-loop response. A simplified nonlinear vehicle longitudinal dynamics model is derived and utilised as a plant to simulate the control response from a real car. For a fair comparison, both PFC and PID are tuned to achieve the similar desired closed-loop time response. Qualitatively, the results show that PFC provides a better closed-loop response, constraints handling, and disturbance rejection compared to PID. Besides, it is also found that the tuning approach of PFC is more intuitive and practical in nature which can be very handy for the future development of an autonomous cruise control application © The Authors 2022. Published by Penerbit UMP. This is an open access article under the CC BY license.


Author keywords

Cruise control; Model predictive control; Pid control; Predictive control; Tuning performance

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