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Modelling of Vehicle Longitudinal Dynamics using System Identification
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Abstract
This paper presents an alternative modelling technique known as system identification to represent longitudinal vehicle dynamics that relates input of pedals pressing to the output speed. The input and output data are recorded by simulating a high-fidelity nonlinear vehicle mathematical model with suitable sampling time. Different excitation input ranges are tested for the training process to get the best model representation. Once a suitable transfer function is obtained, a PID controller is tuned and implemented to control the brake and throttle pedals of the car based on the desired velocity profile. The simulation results show that the tuned PID controller managed to track the standard FTP75 drive cycles with an acceptable response. Based on these findings, it is noted that the system identification model can become a good alternative modelling technique to design a model-based controller or tune a classical controller for future application.

Index Keywords
Controllers, Digital storage, Electric control equipment, Identification (control systems), Proportional control systems, Religious buildings, Vehicles; High-fidelity, Input and outputs, Input datas, Longitudinal dynamics, Modelling techniques, Output data, PID controllers, Pressung, System-identification, Vehicle's dynamics; Three term control systems

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