Analytical Approximation of Fuel Consumption and Periodic Behaviors for a Vehicle that Travels Through a Traffic Light Series [

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Analítica

In this paper, we present a piecewise smooth system, that describes the dynamics of a single vehicle moving through a street that has a sequence of lights that turn on and off with a specific frequency. The model presents three dynamic ways: accelerated, decelerated and zero state. Besides, we show the description of the mathematical model used to simulate the system. The simulation was developed under an event-based scheme and implemented in Matlab. To make the numerical analysis, we take as a parameter study the cycle traffic light, which provides benefits to vehicular traffic system due to its configuration is achieved implementing optimization strategies for the phenomenon of green wave and reduces the traveltime as the vehicle minimizes the number of stops along the road. Also, the stability was studied for the periodic orbits one and two. Finally, we made an approximation of fuel consumption. We assume that this is proportional to the mechanical energy produced by the motor. From this point of view, it can be concluded that it is possible to apply modeling and simulation strategies based on dynamic systems to understand the complex behaviors associated with the travel of vehicles in a traffic controlled by traffic lights.

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