

Investigating vehicle characteristics behaviour for roundabout cornering

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ABSTRACT

The allowable range of speed that a vehicle can tolerate in a constant radius turn is crucial for the development of smart assistance systems. Although the development of advanced system observers has been grown since early days of its introduction, extensive study is required in monitoring the vehicle's behaviour in the conditions such as variation of vehicle dynamic parameters and terrain type. Autonomous vehicles will fail to judge the parameter of the road cornering due to the safety constraints of the vehicle. Thus, the primary concern of this paper is to study the vehicle's behaviour for different curvature profiles. A real-time simulation for a typical Sedan is presented to test a constant roundabout turning with a radius of 50 m for this measure. In prior to that, a detailed analysis on the vehicle stability and handling responses are discussed. The vehicle is found to be traveling in a stable region at a speed from 10 to 74 km/h. The vehicle enters a critical area when speed is more than 74 km/h. Therefore, that the allowable range of speed that the vehicle can travel in a 50 m radius turn lies between 10 to 74 km/h. The stability is evaluated by two criterions which are the yaw rate and sideslip angle.

KEYWORDS

Vehicle dynamics; Roundabout cornering; Stability analysis

ACKNOWLEDGEMENTS

The authors would like to thank Ministry of Higher Education (KPT) and Universiti Malaysia Pahang (www.ump.edu.my) for financial supports given under FRGS/1/2018/TK08/UMP/02/1 (University Reference: RDU190104), RDU1803139. The authors also thank the research team from Autonomous Vehicle Laboratory AEC, Innovative Manufacturing, Mechatronics and Sports Laboratory (iMAMS); who provided insight and expertise that greatly assisted in the present research work.