

大客車縱向防撞警示法則參數模糊化之建立與應用

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摘要

Vehicle rear-end collision avoidance warning system (RCAWS) or forward collision avoidance warning system (FCAWS) is the system that integrates the advanced detecting technology, auditory, visual or tactile display devices, and rear end collision warning algorithm to provide the timely alert messages to drivers according to different road and traffic conditions. The alert messages can be used to warn drivers to keep safety spacing between the lead vehicle and the following vehicle for avoiding rear end crashes. The effect of safety protection will also be achieved. Since the frequency of bus accidents due to without keeping safety spacing is very high in Taiwan, it has become an important issue of advanced safety bus technology research to develop the bus rear-end collision avoidance warning system concerns bus driver' s driving characteristics. While the rear-end collision avoidance warning system offers great potential to improve automobile safety, beneficial effects depend on the joint performance of the system and the driver psychology and behavior acceptance. By reviewing the developed and developing RCAWS algorithms, driver' s perception reaction time, braking deceleration and stationary vehicle spacing of the warning threshold are three major parameters in the RCAWS algorithm. These parameters influence the timing of warning system opening. The proper combination of these three parameters will be different by different driver psychology-behavior characteristics. This study designed the emergency braking simulation scenario of bus car following driving on the freeway straight road section by utilizing the bus driving simulator. The bus drivers with license that are working in freeway bus companies were invited to do the simulation experiments under this designed driving simulation scenario. The sample data of perception reaction time, braking deceleration and stationary vehicle spacing were collected and analyzed after bus driving simulator experiments. The value

range of perception reaction time is from 0.72 seconds to 3.23 seconds. The value range of braking deceleration is from -1.47 meters/square second to -7.25 meters/square second. The value range of stationary vehicle spacing is from 2 meters to 12 meters. This study developed the safety membership function of the three parameters and analyzed the reasonable bus rear-end collision avoidance algorithm with related warning rules. Twenty-seven safety levels of warning distance equation and the related rules were also developed through the analysis of fuzzy operation rules and defuzzification methods. The results of this study will be a useful basis in developing the rear-end collision avoidance warning system of advanced safety bus.

關鍵字：Bus, Rear-End Collision Avoidance Warning Algorithm, Perception Reaction Time, Braking Deceleration, Stationary Vehicle Spacing.