Destination Celled Platooning of Cooperative Adaptive Cruise Control Vehicles for High-Performance Traffic Streams

Poster Session 1 Abstract

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Automated vehicle platoons, as a new product of technology, are expected to form a high performance traffic stream and mitigate the traffic congestion we are facing today. Vehicles equipped with ACC/CACC can adjust their speed automatically in order to follow the preceding vehicles at small headways, allowing for platoon formation and thereby increasing freeway capacity. However, platoon traffic efficiency is largely restricted at the off-ramps by the multiple separation maneuvers due to mixed destinations of vehicles in the platoon. And presently, separation strategies for platoons with mixed destinations platoon are not yet available. Therefore, for high performance of automated vehicle platooning, a reasonable and practical strategy for mixed destination platoons is of great importance and necessity.

The poster proposes a destination celled platooning strategy which focuses on the platoon separation and mixed destinations both. It is described as clustering and sorting vehicles into cells in a platoon according to their destinations. Two types of destination celled platoons (random celled platoon and ordered celled platoon) are discussed and the structures and features of platoon are illustrated in the poster. In addition, to evaluate the impacts on traffic efficiency, this study establishes a simulation model in MATLAB with three scenarios representing three platooning strategies, using Cooperative Adaptive Cruise Control. The results show that the ordered celled platooning strategy has superiority in traffic efficiency and stream stability as the result of the least delay, the smallest average time gap, the least total time-space consumption and the minimum speed fluctuation.