Abstract

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Modelling Bus Bunching using Cellular Automata.

Bus bunching is a common problem in street-transit systems with high service frequency. Bunching can lower transit capacity and affect users' satisfaction. In this paper, a bus route is modelled to investigate the effects of variations in demand on headway instability and bus bunching phenomenon. Besides, with the aim of comparing different bunching situations, an index is proposed based on bunching severity and intensity. Severity corresponds to the number of buses involved in bunching and intensity accounts for total deviations from designed headway. A one-dimensional Cellular Automata (CA) model is developed to simulate a designed route service under different demand conditions. Unlike previous researches, the focus of this study is on one design point with an operational approach, rather than obtaining a phase diagram from random demand and service frequencies. Using the proposed bunching index, it is shown that randomness in passenger arrival rate involves 65% of the service in bunching. Analyzing other factors such as road traffic, bus speed, and bus capacity, etc. on bunching formation, in addition to studying the effect of bunching on maintaining schedule and service reliability is suggested for future works.