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Development of Vehicle Delay and Queue Length Models for Adaptive Traffic Control at Signalized Roundabout

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Abstract

Vehicle delay and queue length models are important indexes to optimize signal timing plan for a signalized roundabout. However, at present much attention is paid on unsignalized roundabouts. In this paper, we firstly analyzed the impacts of phasing schemes on vehicle movements and brought forward two typical phasing schemes. The loop detector layout plan was established to detect vehicle volumes of different streams in real time. Then under each phasing scheme, the models for average vehicle delay and queue length were developed respectively. Finally, case study was conducted to evaluate the models using field data collected from a real signalized roundabout. The results show that: all precision errors are smaller than 15% and average precision errors are smaller than 10%. The developed two types of models can satisfy the requirements of engineering.

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1. Introduction

In China, there are many large-sized signalized roundabouts in the central business district (CBD) of the cities. For example, the Museum roundabout in Harbin city, the Renmin roundabout in Changchun city and the Fountain roundabout in Guiyang city. Unlike western countries where roundabouts are located at minor-minor streams [5,6], the roundabouts are usually located at major-major streams in China. At present, traffic congestion at these

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