

## DEPARTMENT OF CIVIL ENGINEERING

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#### HONG KONG SOCIETY FOR TRANSPORTATION STUDIES And INSTITUTE OF TRANSPORT STUDIES in HKU

## SEMINAR

# Planning of Substitute Bus Service for Metro Disruption Management

Dr. ZHANG Shuyang Wuhan University of Technology, China

Date:July 3, 2023 (Monday)Time:10:00 a.m. - 11:00 a.m.Venue:Room 612B, 6/F Haking Wong Building, The University of Hong Kong

#### Abstract

Often serving as the backbone for public transport in metropolitan areas, any major disruption in the metro system will have a severe impact, affecting tens of thousands of passengers. Even for the most reliable metro systems, such as the Mass Transit Railway (MTR) in Hong Kong, on average there are hundreds of service disruptions every year, with some lasting for a few hours. It is, therefore, imperative to develop contingency plans for disruption management. This is particularly important for metro systems running on single tracks, without parallel lines, wherein any rail blockage would require Substitute Bus (SB) for bridging the disrupted railway sections. This study will address three imporant issues in the development of SB contingency plans for metro system disruption management. The first issue regards the initiation time for SB service. As the duration of a metro disruption varies and cannot be predicted perfectly ahead of time, the response timing is critical. Initiating SB service too early would confuse passengers and have cost implications; initiating too late, on the other hand, would exacerbate the problem as the unsatisfied demand accumulates. The second one pertains to the routings of SB service and the fleet sizes upon their initiation. The analysis should consider demand redistribution due to the disruption, which introduces uncertainty to the problem. Two types of SB services to cater for the affected demand are proposed: regular SB service and flexible SB service. The third concern regards the negotiation between the metro company and the bus company to put together of a fleet to serve as SB. The analysis will focus on developing cost-effective portfolios to supply the needed SB fleet. We will use Hong Kong and Shanghai case studies to demonstrate the modeling framework. This research will open up theoretically interesting and practically important topics to enhance the SB service for metro system disruption management.

#### About the Speaker

Dr. ZHANG Shuyang was born in Wuhan, Hubei, China in 1988. He received the B.S. and M.S. degrees in transportation engineering from Tongji University, Shanghai, China, in 2010 and 2013, respectively, and the Ph.D. degree in civil engineering from the Hong Kong University of Science and Technology, Hong Kong, China, in 2018. From 2018 to 2019, he was a Post-doctoral Fellow in the Department of Civil and Environmental Engineering of the Hong Kong University of Science and Technology. Since 2020, he has been an Associate Professor with the School of Transportation and Logistics Engineering, Wuhan University of Technology. His research interests include public transit operations, bus bunching control, and substitute bus service design after metro disruptions. His research work has been published in various journals such as Transportation Research Part B, Transportation Research Part C, Transport Reviews, etc.