



“Gheorghe Asachi” Technical University of Iasi, Romania



INTEGRATION OF CONGESTION-RELATED EMISSIONS IN A TRANSIT BUS SCHEDULING PROBLEM DURING RUSH HOURS

Yan Chen, Huajun Tang*, Ting Nie, Xinnong Lin

Macau University of Science and Technology, Department of Decision Sciences, Macau, China

Abstract

The wide spread traffic congestion witnessed in urban transportation network, especially during rush hours, aggravates vehicle exhaust emissions. Previous studies reveal that congestion not only slows down the traffic flow but also significantly increases emissions. This highlights the need of accounting for congestion-related emissions in transportation planning. In this paper, congestion-related emission is incorporated into a transit bus scheduling problem by a nonlinear programming model to minimize the total respirable suspended particle emissions during rush hours. A real-world instance is then formulated using the proposed model and solved by CPLEX in a case study. Computation results from the case study indicate that by taking congestion-related emission into account, the urban transportation planning can not only significantly reduce the total particle emissions, but also save passengers' travel time at the cost of relatively small increases in distance traveled.

Key words: particulate emissions, respirable suspended particle, rush hours, traffic congestion, transit bus scheduling

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* Author to whom all correspondence should be addressed: e-mail: hjtang@must.edu.mo; Phone: +853 8897 2874; Fax: +853 2882 3281