

ADVANCED FUZZY TRAFFIC CONTROLLER FOR URBAN EXPRESSWAYS

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ABSTRACT. *Advanced traffic control would be developed as an extension of practical fuzzy control for urban expressways in the study. Since the uniform toll system at entrances is adopted in Japanese urban expressways, the toll booths are installed at the ramp ways to the expressway. Therefore, the inflow traffic control with toll booth operations has been applied to maintain smooth and safe traffic on the expressway. In particular, the discrete inflow control has been applied to real operations with restriction of traffic flow on the expressway. As the number of opening booths is decreased at the entrance, the inflow traffic can be restricted with proper level. Referring to the operations in the real world, the discrete traffic control with decision of human operators has been formulated by the fuzzy control approach by the authors in the late 1980's. It is summarized as significant results of this research that the essential traffic control for urban expressway can be discussed based on the fuzzy control formulations.*

Recently, background of traffic control has drastically changed. In particular, the rapid progress of intelligent information technologies can be seen even in the field of traffic control. Therefore, the advanced traffic control is required as a sort of intelligent transport system (ITS). On the other hand, the methods of fuzzy reasoning have been summarized from many applications in the practical fields. According to the purpose, the advanced inflow traffic controller would be proposed corresponding to the recent progress of traffic control technologies as well as soft-computing. In terms of technology, the continuous traffic control becomes available in place of the discrete control. It means that, an advanced inflow traffic control can be formulated by fuzzy logic reflecting the complicated environment of traffic on the real urban network in the study. The flexible and robust traffic controller can be created with the formulation of fuzzy logic. Furthermore, the optimization of parameters for an efficient traffic controller can be performed by genetic algorithm (GA) as well. The fuzzy traffic controller is evaluated through the estimation of traffic condition by the traffic simulation for urban expressways. Therefore, it can be summarized from the above results that the recent progress in information technology and soft-computing produces the superior traffic controller for urban expressway with the formulation of fuzzy control.

Finally, the advantages of fuzzy inflow traffic controller can be summarized in comparison to the discrete controller as a conventional method. The numerical example of traffic control should be provided corresponding to the real urban expressway database. It would be confirmed that the advanced inflow controller provides efficient traffic flow on the urban expressway even with the complexity of the real world.

Keywords: Fuzzy controller, Fuzzy logic, Inflow control, Genetic algorithm, Urban expressway