▣ 博士學位論文紹介 ▣

논 문 제 목 : 실시간교통제어를 위한 수리적 동적통행배정모형의 개발
(Analytical Dynamic Traffic Assignment Approaches for Modelling Integrated Real-Time Traffic Control Systems)

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Minimizing network travel cost is one of the major goals of Intelligent Transportation Systems (ITS) implementation in sophisticated dynamic traffic networks. Integrated approaches to simultaneously consider both traffic control systems and travelers' behavior should provide the best opportunity for reducing the total network cost. In an operational ITS system, integration of real-time traffic control systems and analytical dynamic traffic assignment(DTA) models is expected to achieve the desired result.

This research uses three major approaches to enable the integration of real-time traffic control systems within an analytical DTA framework. First, the computational time of analytical DTA models is substantially reduced so that the DTA models can be applied as real-time information tools. The dynamic route choice conditions are redefined using a set reduction scheme(SRS). In the SRS, only "used" links, paths and entry times of inflows into links are considered in the formulation and the solution algorithm. Therefore, compared to the previous Variational-Inequalities-based DTA models, which consider the entire feasible solution set, the problem scale can be compressed substantially, thus dramatically reducing computational time.

Second, a rolling horizon implementation procedure is introduced into the DTA process to take into consideration both spatial and temporal variation of demands and network conditions. In the rolling horizon framework, origin-destination(OD) demands are assumed to be updated on-line and network conditions are changed from time to time. To reflect these real-time variations in the middle of DTA process, the planning horizon time is divided into several stages and in each stage, the DTA procedure is implemented with updated real-time demand and network information. The rolling horizon implementation provides a practical method to address the real-time traffic assignment problem and the guidance strategy based on information infrastructure.

Third, a conceptual model is proposed to integrate a real-time traffic control system and a path-based analytical DTA model. The four sub-modules in this system are: 1) rolling horizon implementation, 2) dynamic actuated traffic control, 3) on-line calibration, and 4) path-based analytical DTA model. This integrated system is expected to play an important role to support traffic management and route guidance in a dynamic traffic network.