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Book Review

Tampère, C.M.J., Viti, F. and Immers, L. H. (eds.): New Developments in Transport Planning: Advances in Dynamic Traffic Assignment

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This book contains a selection of contributions from the second Dynamic Traffic Assignment (DTA) Symposium held at the Katholieke Universiteit Leuven, Belgium, in June 2008. The nineteen individual chapters of the book are suitably classified in four distinct parts, providing a coherent state-of-the-art overview of fundamental DTA research and practice. The international experts that contribute to the book are leading researchers in the field, and provide both wide-spread reviews and fresh looks on the various issues related to DTA.

Over the last three decades, there has been a continuous development of DTA tools and methods, as a response to growing challenges in transportation planning and operations. As exemplified in several book chapters, DTA models provide viable solutions to problems that cannot be properly solved by static assignment tools, and are more suitable to solve network-wide problems compared to detailed microscopic traffic simulation models.

The first chapter of the book, written by Viti and Tampère, provides an excellent introduction of its contents. In addition to the concise overview of DTA elements, the extensive reference list of this chapter offers a comprehensive starting point. The authors provide a fine classification of DTA models by three different aspects: solution properties, travel choice behavior and dynamic network loading models. These aspects subsequently form the first three parts of the book, complemented by a fourth part that describes practical applications.

The first part consists of six chapters that investigate existence, uniqueness, convergence and stability of DTA models. As a whole, the contributions to this part benefit from previous research on DTA model formulations. Cantarella (Chapter 2) presents a general framework for signal setting with dynamic process assignment, and applies the model for simple networks. Smith (Chapter 3) also investigates the signal setting problem by combining assignment and control models. Stability of the results is illustrated for a simple network and derived for a more general case. Iryo (Chapter 4) defines a game of Dynamic User Equilibrium (DUE) assignments, and examines the existence of pure

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Nash equilibrium in DUE games. Friesz, Kim, Kwon and Rigdon (Chapter 5) develops a variational inequality formulation for the dual time-scale DUE, which considers both within-day decisions such as route and departure time, and day-to-day demand variations. Mounce and Carey (Chapter 6) discuss the convergence of DTA algorithms for various route swap processes. Concluding this part, Rahamim, Nitzani and Bar-Gera (Chapter 7) compares the performance of three dynamic route choice algorithms, differentiated by the mechanism that determines the changes to the demand proportions matrix.

The second part of the book consists of five chapters that focus on dynamic network loading (DNL) models. Gentile (Chapter 8) presents in detail the General Link Transmission Model and compares it with a well-known DUE algorithm. Corthout, Tampère and Immers (Chapter 9) present an efficient network loading method that accounts for travel time variability due to incidents. Frederix, Tampère, Viti and Immers (Chapter 10) examine the effect of different queue mechanisms in the DNL models on the dynamic origin-destination (OD) estimation. Kalafatas and Peeta (Chapter 11) develop a graph-based formulation for the multiple destinations DTA problem, which constitues a graph-theoretic extension of the cell transmission model. In the final chapter of this part, Tsubota and Kuwahara (Chapter 12) study the dynamic system optimum assignment by equilibrating path marginal times.

In contrast to the first two parts, which share more homogeneous topics, the third part of the book consists of four chapters that address different issues related to the incorporation of advanced travel choice behavioral models in DTA models. Adnan (Chapter 13) proposes a modeling framework to integrate the demand side with the supply side, and presents numerical experiments for a simple home-work tour scheduling problem. Flotterod (Chapter 14) describes an efficient DNL method to assign microscopic (individual) demand. Pel, Bliemer and Hoogendoorn (Chapter 15) present a DTA modeling framework that includes both pre-trip and en-route route choices. Finally, Ge and Stewart (Chapter 16) consider boundary issues arising from congestion charging when using the DTA approach in a bottleneck scenario.

The last part of the book contains three chapters that present and discuss issues related to implementations of DTA models. As pointed out in Chapter 1, all models presented in this chapter are simulation-based DTA models. Chen, van Zuylen, and van der Hoeven (Chapter 17) present a decision support system that is being implemented for a large urban network. Cipriani, Florian, Mahut and Nigro (Chapter 18) investigate a gradient approximation approach based on the SPSA method to solve the dynamic OD estimation problem. Behrisch, Krajzewicz, Wagner and Wang (Chapter 19) compare the performance of an original DTA model with modifications with respect to different assignment techniques and route choice models. All three chapters share the common fact that the ability to solve large-scale problems comes at the expense of certain simplifications with respect to a more rigorous supply side representation.

The first three parts of the book provide very useful material for students and researchers, while the last part contains interesting discussions and examples for practitioners. Given the extensive list of references provided at the end of each individual chapter, the book would greatly benefit if the index included also these references. It is noticeable that most of the examples presented throughout the chapters are based on very simple networks, although in many chapters additional on-going tests are indicated in the conclusion sections. Similar to other books based on selected contributions, the strength of the present book relies on the wide range of experts' opinions and ideas condensed in a single volume. The reading will certainly stimulate further thinking and research on this promising field.