

**Friesz, Terry L.; Luque, Javier; Tobin, Roger L.; Wie, Byung-Wook**

**Dynamic network traffic assignment considered as a continuous time optimal control problem.** (English) [Zbl 0691.49029](#)

Oper. Res. 37, No. 6, 893-901 (1989).

Summary: Two continuous time formulations of the dynamic traffic assignment problem are considered, one that corresponds to system optimization and the other to a version of user optimization on a single mode network using optimal control theory. Pontryagin's necessary conditions are analyzed and given economic interpretations that correspond to intuitive notions regarding the dynamic system optimized and dynamic user optimized traffic flow patterns. Notably, we offer the first dynamic generalization of Beckmann's equivalent optimization problem for static user optimized traffic assignment in the form of an optimal control problem. The analysis further establishes that a constraint qualification and convexity requirements for the Hamiltonian, which together ensure that the necessary conditions are also sufficient, are satisfied under commonly encountered regularity conditions.

**MSC:**

[49L20](#) Dynamic programming in optimal control and differential games

[49K15](#) Optimality conditions for problems involving ordinary differential equations

[90B10](#) Deterministic network models in operations research

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**Keywords:**

dynamic traffic assignment problem; Pontryagin's necessary conditions

**Full Text:** [DOI](#)