

A microeconomic interpretation for the system optimal traffic assignment problem with nonadditive path cost

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Abstract

Using a Bergson–Samuelson welfare function, we outline a microeconomic interpretation of the effects of the non-linearity in the time/cost relationship for travellers in a congested transport network. It is demonstrated that a marginal cost traffic flow assignment following Wardrop's second principle, although it minimizes the total cost of a transport network, may reduce social welfare compared to the market equilibrium assignment based on Wardrop's first principle. A welfare-maximizing assignment model is presented and used to show that if the travellers' utility functions are linear, the assignment that maximizes social welfare will be the same as the assignment that minimizes total network cost, but if users' utility functions are non-linear (reflecting the traditional non-satiation and diminishing marginal utility axioms), the two assignments will be different. It is further shown that the effects of this non-linearity are such that a welfare-maximizing assignment will meet with less user resistance than a minimum total network cost assignment.

Keywords

- [traffic assignment](#),
- [Wardrop](#),
- [minimum cost](#),
- [social welfare](#),
- [utility function](#)

