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**Simplicial decomposition with disaggregated representation for the traffic assignment problem.** (English) [Zbl 0764.90033](#)

Transp. Sci. 26, No. 1, 4-17 (1992).

Summary: The class of simplicial decomposition (SD) schemes has shown to provide efficient tools for nonlinear network flows. When applied to the traffic assignment problem, shortest route subproblems are solved in order to generate extreme points of the polyhedron of feasible flows, and, alternately, master problems are solved over the convex hull of the generated extreme points. We review the development of simplicial decomposition and the closely related column generation methods for the traffic assignment problem; we then present a modified, disaggregated, representation of feasible solutions in SD algorithms for convex problems over Cartesian product sets, with application to the symmetric traffic assignment problem. The new algorithm, which is referred to as disaggregate simplicial decomposition (DSD), is given along with a specialized solution method for the disaggregate master problem. Numerical results for several well known test problems and a new one are presented. These experimentations indicate that only few shortest route searches are needed; this property is important for large-scale applications. The modification proposed maintains the advantages of SD, and the results show that the performance of the new algorithm is at least comparable to that of state-of-the-art codes for traffic assignment. Moreover, the reoptimization capabilities of the new scheme are significantly better; this is a main motive for considering it. The reoptimization facilities, especially with respect to changes in origin-destination flows and network topology, make the new approach highly profitable for more complex models, where traffic assignment problems arise as subproblems.

**MSC:**

- [90B10](#) Deterministic network models in operations research
- [90C35](#) Programming involving graphs or networks
- [90-08](#) Computational methods for problems pertaining to operations research and mathematical programming
- [90B06](#) Transportation, logistics and supply chain management

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[transportation network](#); [simplicial decomposition](#); [nonlinear network flows](#); [traffic assignment](#); [origin-destination flows](#); [network topology](#)

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