ABSTRACT

series of papers «Traffic assignment in large-scale road networks»

PhD, Associate Professor, Saint Petersburg State University

Alexander Yu. Krylatov

Series of papers «Traffic assignment in large-scale road networks» is devoted to the development of methodological tools for traffic flow assignment in large road networks. Efficient performance of intelligent transportation systems could be based solely on significant theoretical results in such scientific fields as traffic flow theory, data mining, numerical methods, etc. One of the crucial problems in traffic flow theory is traffic assignment problem. Nowadays, the majority of efficient algorithms for traffic assignment finds link-flows as a solution. However, generally it is not possible to find route-flows if link-flows are available only. Nevertheless, from practical perspective, route-flows could be highly required. Indeed, if administrator increases capacity of certain link, then it could lead to bottleneck effect. In turn, if administrator increases capacity of the route, then the journey between origin and destination becomes more convenient. Series of papers develop new efficient methods of traffic assignment that find route-flows on transportation network.

Particularly note that the development of models and methods for traffic assignment problem, on the one hand, gives urgent practical results, on the other hand, leads to new techniques and approaches for coping with different nonlinear optimization problems. Therefore, the development of this scientific field contributes both in theory (constrained nonlinear optimization, mathematical modelling, operations research, etc.), and practice (decision-making support in transportation, in-vehicle routing guide systems, transportation planning systems, etc.). Bi-level optimization should be stressed here by virtue of its particular importance for practical purposes. Indeed, the decision-maker intends to optimize traffic conditions, that are depended on link-flows or route-flows. In turn, to estimate the reaction of traffic flows, the appropriate optimization problem of lower level has to be solved. Thereby, a comprehensive study of traffic management contributes to the development of methods for bi-level optimization. Moreover, methods for route-flows estimation appear to be useful for multi-supplier and multi-consumer power grid systems. Really, link-flows assignment is not sufficient to determine which supplier-consumer pair loads the certain link.

Publications of A.Yu. Krylatov show that developed models and methods could be employed when solving following set of problems:

1. Traffic assignment problem.
2. Urban road network design problem.
3. Transit network design problem.
4. OD-matrix estimation problem.
5. Development of competitive and cooperative smart grids.

Alexander Yu. Krylatov proceeds to develop models and methods in the above areas. Moreover, investigation of narrow class of crucially important route-flows assignment problems will be continued. Theoretical results obtained in these areas could be a basis for a number of intelligent transportation and telecommunication systems.