

# Hierarchical regulator of traffic flows

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**Keywords:** traffic flow, control, modelling

**Abstract:** The traffic flow control by traffic lights is the way how to decrease negative impacts of daily traffic in cities. The paper introduces a concept of the hierarchical traffic flow regulator for a urban area. The aim is to derive an optimal setting of signal scheme parameters according to actual traffic conditions with maximum utilization of available traffic information. Main principles of modelling, state and parameter estimation and control strategies are briefly described for each control level.

This task is trivial in case of complete knowledge of all measured traffic quantities and parameters (like saturation flows, turning ratios, etc.) for all junction arms. However, the net of all needed detectors is not usually complete and some significant traffic flows (parking cars, etc.) are not measurable in practice. The problem of low accuracy of model parameters or missing measurements is also discussed. The efficiency of proposed method is demonstrated by several experiments.

## References

- [1] C. Diakaki, V. Dinopoulou, K. Aboudolas, and M. Papageorgiou, “Deliverable 9: Final system development report, ist-2000-28090,” in *Signal Management in Real Time for urban traffic NETWORKS*. Technical University of Crete, 2002.
- [2] M. Papageorgiou, C. Diakaki, V. Dinopoulou, A. Kotsialos, and Y. Wang, “Review of road traffic control strategies,” in *Proc. of the IEEE*, vol. 91, pp. 2043 – 2067, December 2003.
- [3] C. Diakaki, *Integrated control of traffic flow in corridor networks*, Ph.D. thesis, Department of Production Engineering and Management, Technical University of Crete, Chania, Greece, 1999.
- [4] J. Mück, “Using detectors near the stop-line to estimate traffic flows,” *TEC*, pp. 429–434, December 2002.
- [5] C. Diakaki, M. Papageorgiou, and K. Aboudolas, “A multivariable regulator approach to traffic-responsive network-wide signal control,” *Control Engineering Practice*, 10:183 – 195, 2002.
- [6] J. Kratochvílová and I. Nagy, “Traffic control of microregion,” in *CMP’04: MULTIPLE PARTICIPANT DECISION MAKING, Theory, algorithms, software and applications*, J. Andrýšek, M. Kárný, and J. Kracík, Eds., pp. 161 – 171, Adelaide, May 2004. Advanced Knowledge International.
- [7] J. Kratochvílová and I. Nagy, “Traffic model of a microregion,” in *IFAC World Congress, Preprints*, IFAC, Ed. IFAC, Prague, 2005, accepted.