# Continuous-time modeling of urban traffic

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**Abstract:** The increasing amount of vehicles, overloaded roads, growing jams and number of accidents are main indications of modern transport networks that become critical in cities. Thus, there is a urgent need for the feasible and safe solution optimizing traffic flows in the urban network. The advanced control and optimization approaches are to be employed to find the desired solution. The existing approaches mainly need the reliable and realistic models, see for example [1, 2].

The majority of modern roads is equipped with special detectors, measuring flow of vehicles and is partially controlled via local control scheme on cross-roads. The present work concerns continuous-time modeling of traffic flow that exploits these measurements. The proposed model is built for one traffic lane. The general idea is to use discrete data, measured by traffic detectors, for computing global non-measurable characteristics of the whole lane. In particular, the unobservable length of so-called *congested area* is computed. The congested area is taken as the artificial object of the given length and density, where the vehicles are uniformly distributed. The dynamics of congested area is then modeled through the contraction and dilution of the queue of vehicles. The considered approach is supposed to form a basis for further modeling of roads, cross-roads and city's microregions.

# References

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[2] D. Helbing, S. Lämmer, and J.-P. Lebacque: Self-organized control of irregular or perturbed network traffic. In C. Deissenberg and R. F. Hartl (eds.) Optimal Control and Dynamic Games (Springer, Dortrecht, 2005), pp. 239-274