Fluidodynamic models for traffic flows on networks

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Abstract

Recently some fluidodynamic models for traffic flows on networks were introduced in [3, 2, 5]. The models for the flow, on each edge of the graph representing the network, are given by a single conservation law or a system of hyperbolic equations [1, 6, 7]. The solution at junctions (nodes of the graph) is underdetermined if only conservation of mass is imposed. Thus a first model ([3]) was based on the two rules:

(A) the traffic from incoming edges is distributed on outgoing ones according to fixed coefficients;

(B) respecting (A) the incoming fluxes are maximized.

We illustrate some results on existence of solutions for the Cauchy problem on the whole network as well as recent modelling for the case of telecommunication networks [4].

References

[1] A. Aw, M. Rascle, *Resurrection of "second order" models of traffic flow*, SIAM J. Appl. Math. **60**, 2000, pp. 916–938.

[2] Y. Chitour, B. Piccoli, Traffic circles and timing of traffic ligths for cars flow, to appear on Discrete and Continuous Dynamical Systems-Series B.

[3] G. Coclite, M. Garavello and B. Piccoli, Traffic Flow on Road Networks, to appear on SIAM J. Math. An.

[4] C. D'Apice, R. Manzo and B. Piccoli, Packets flows on a telecommunication network, preprint.

[5] M. Garavello and B. Piccoli, Traffic flow on a road network using the Aw-Rascle model, preprint.

[6] M. J. Lighthill and G. B. Whitham, On kinetic waves. II. Theory of Traffic Flows on Long Crowded Roads, Proc. Roy. Soc. London Ser. A, 229 (1955), pp. 317-345.

[7] P. I. Richards, Shock Waves on the Highway, Oper. Res., 4, (1956), pp. 42-51.