Stochasticity in traffic supply

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Topics

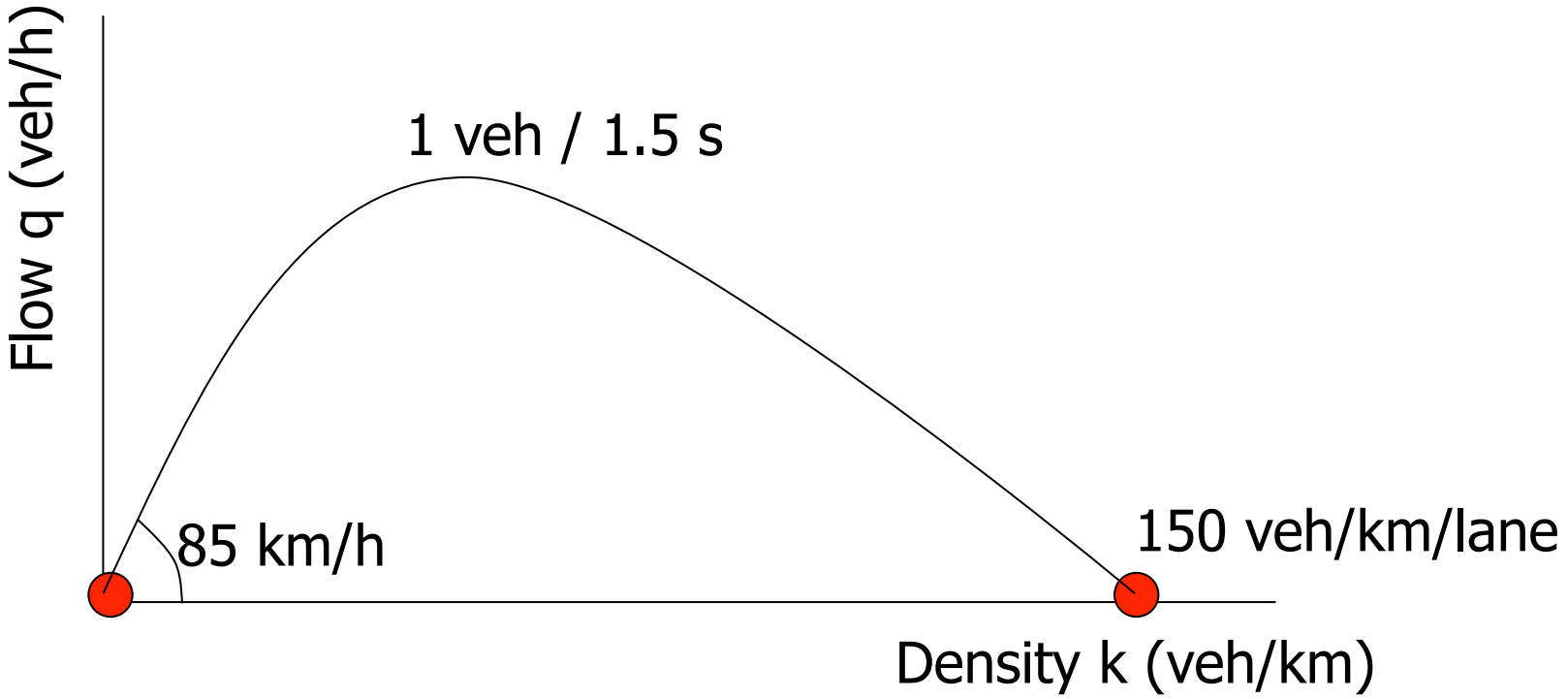
- Fundamental diagram
- Car-following behaviour
- Speed differences
- 3-phase traffic flow theory (stop and go traffic)
- (Lane changes and lane distribution
  – in relation with speed limit)
- Elimination of stochasticity

Traffic flow fundamentals

Traffic flow fundamentals


TIMAX
35

Fundamental diagram



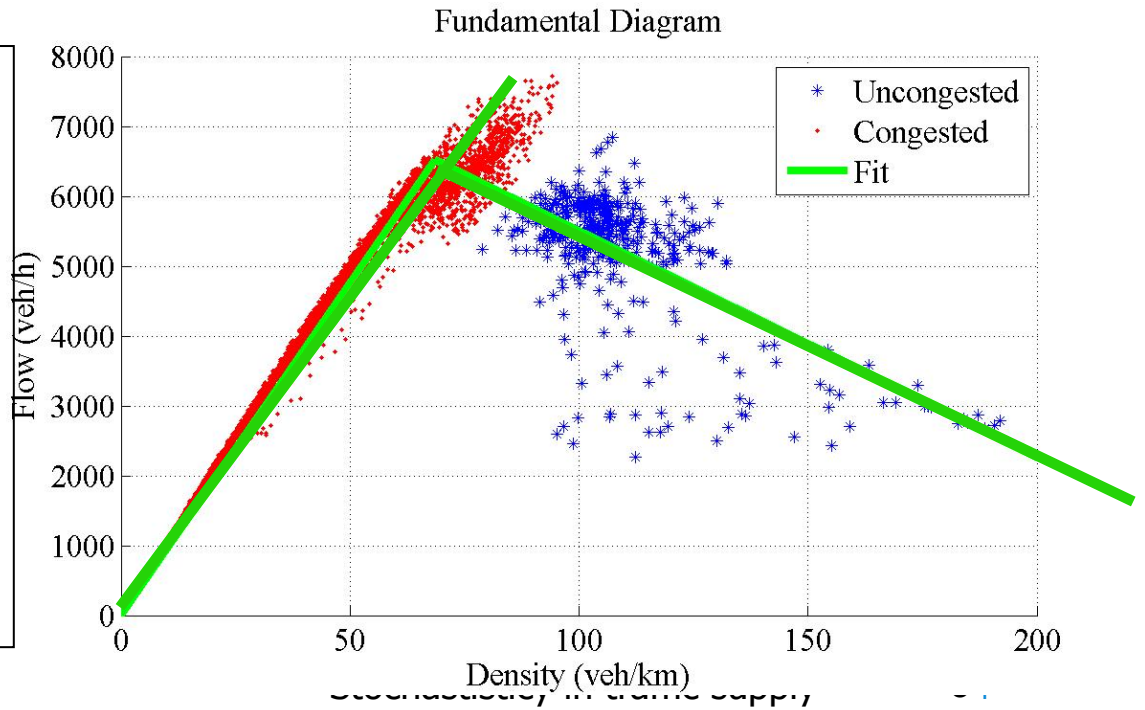
Now, the real world

- Stochasticity
- (and capacity drop)

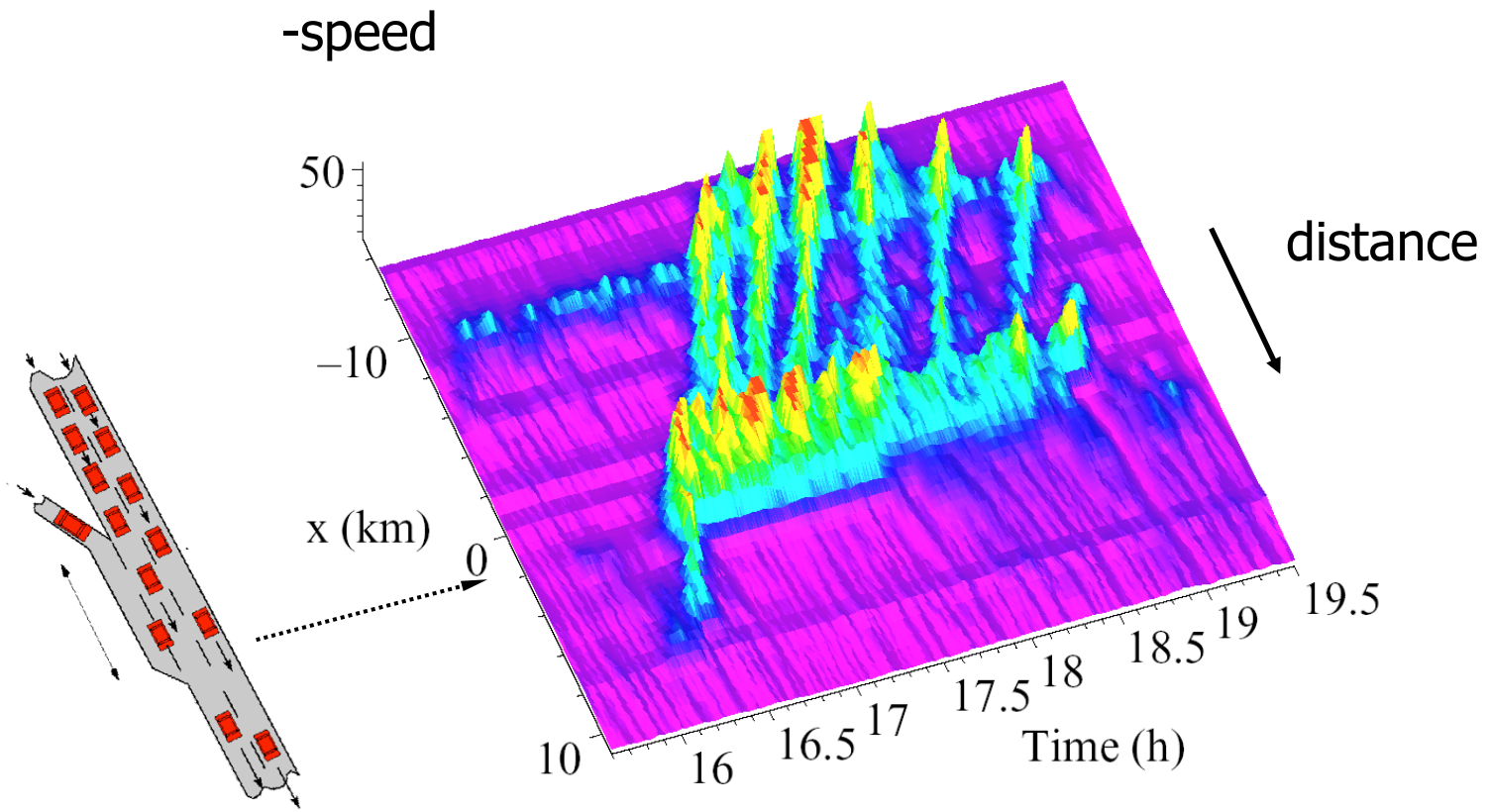
Capactiy drop!

free flow capacity
is higher than
congested capacity

Inverse-lamda
fundamental diagram

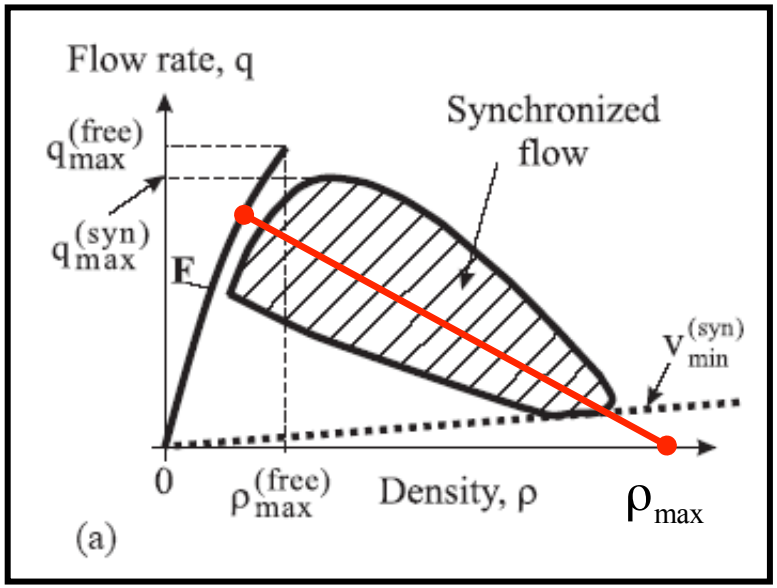


Different traffic phases



Three phases of traffic flow

- Three phase (state) theory of traffic flow:
  - Free flow
  - Synchronized flow (density > critical density, but less than jam density)
  - Wide moving jams (density = jam density)

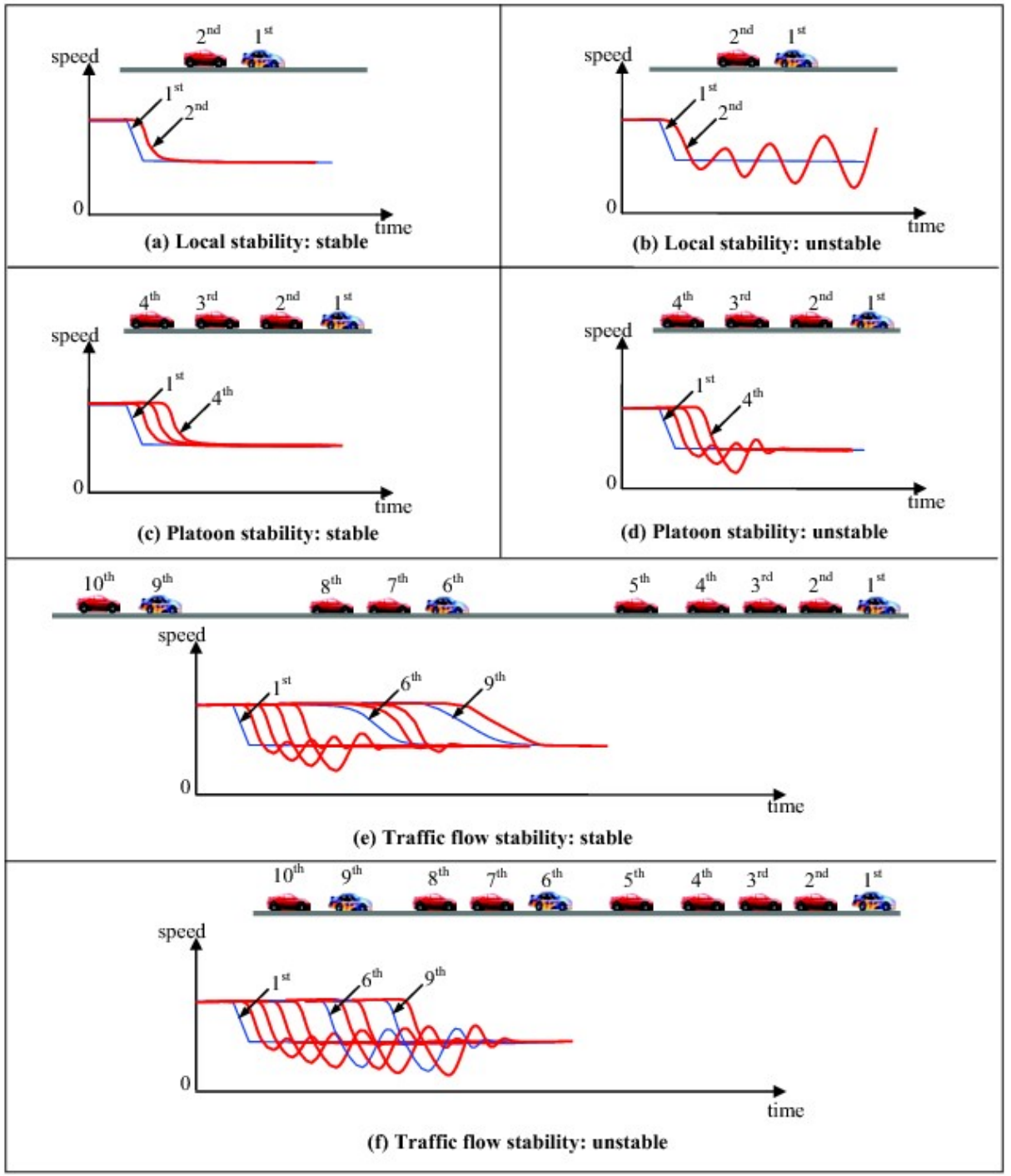


Local stability
(1 follower instable)

Platoon/asymptotic
stability

Traffic flow stability /

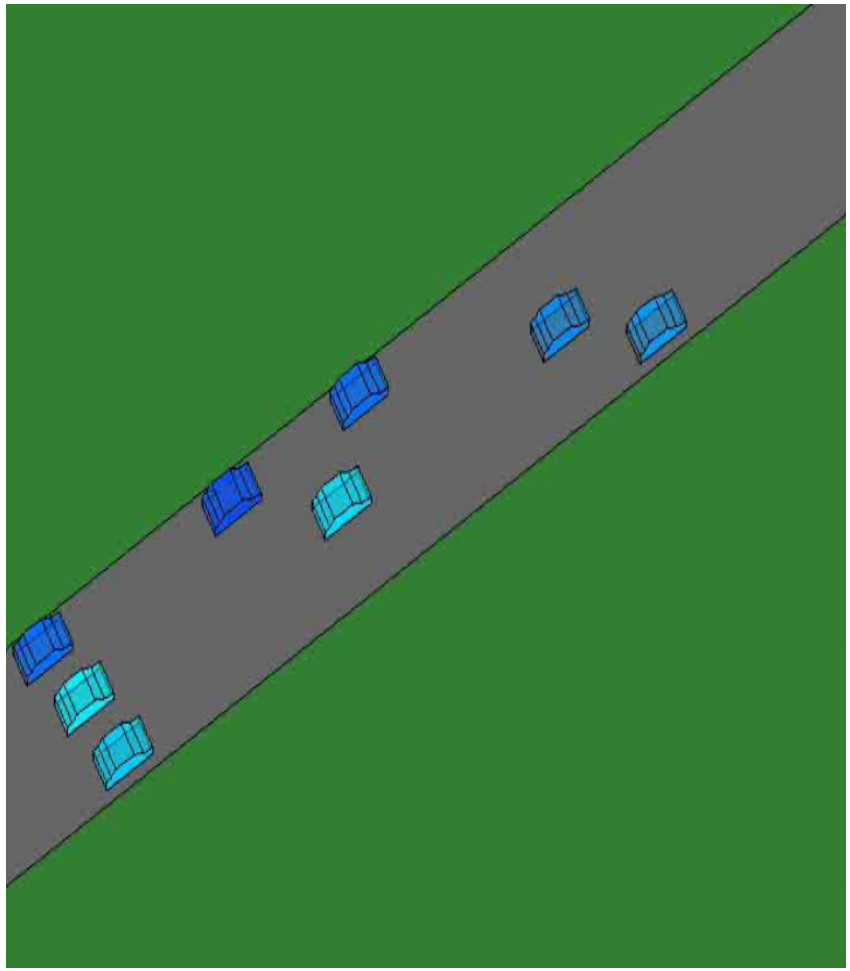
Traffic flow instability



Driving behaviour studies

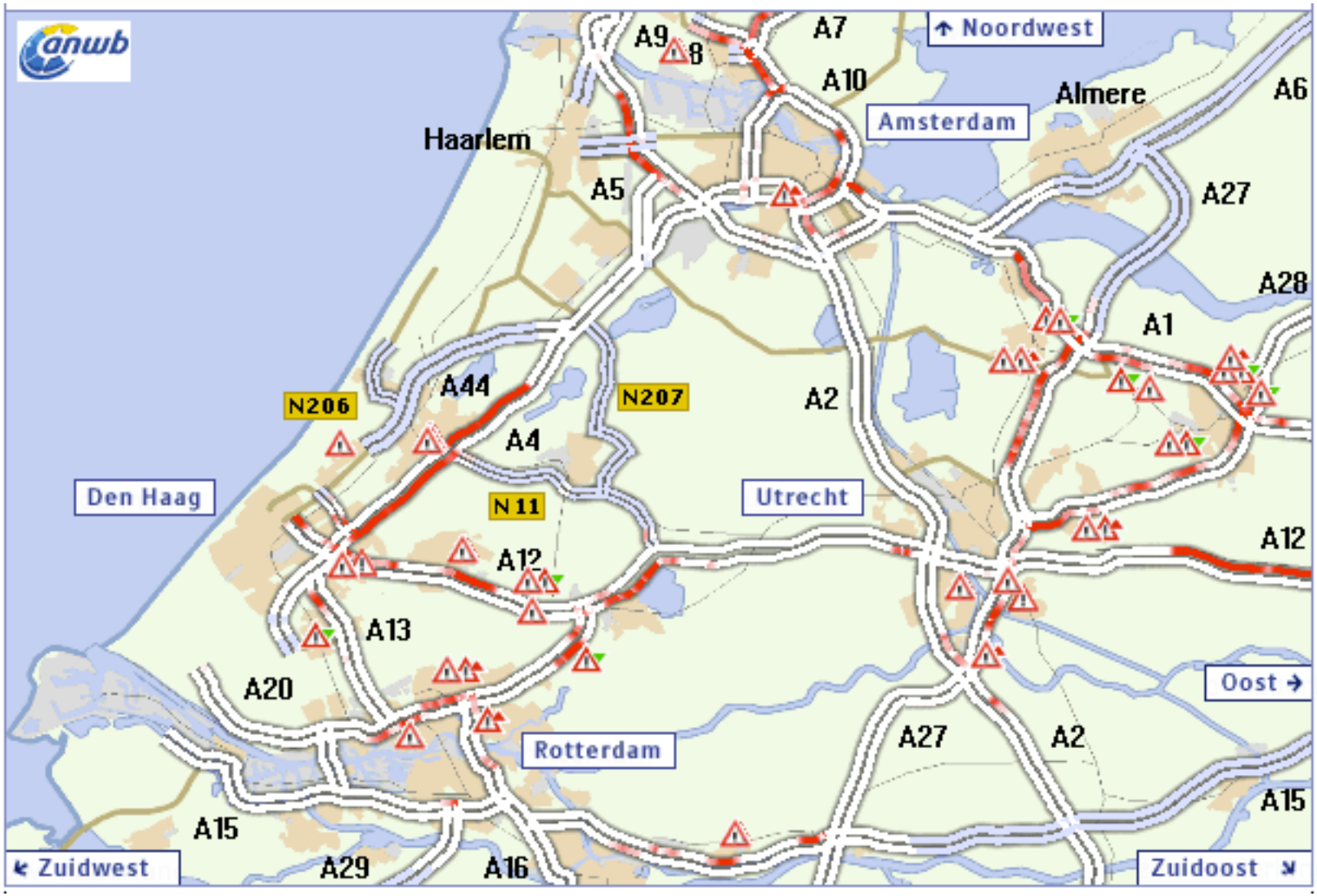
- Studies of car-following behaviour
- Helicoper + video to observe

- => driver heterogeneity
- Different reactions

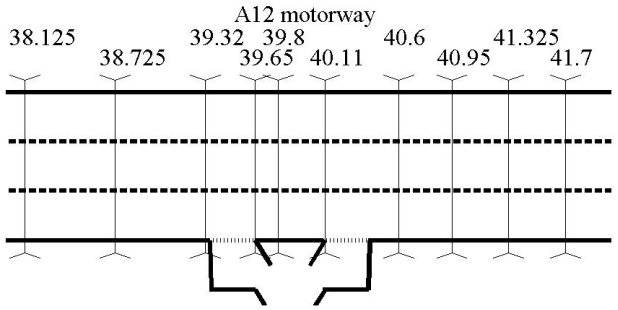


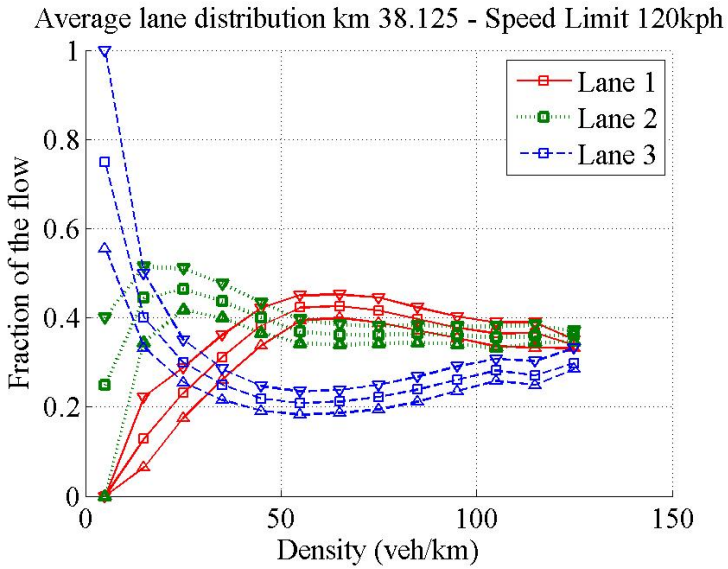
Accident Apeldoorn

- Rubbernecking is reducing the capacity by 30-50% (and some people look more than others)

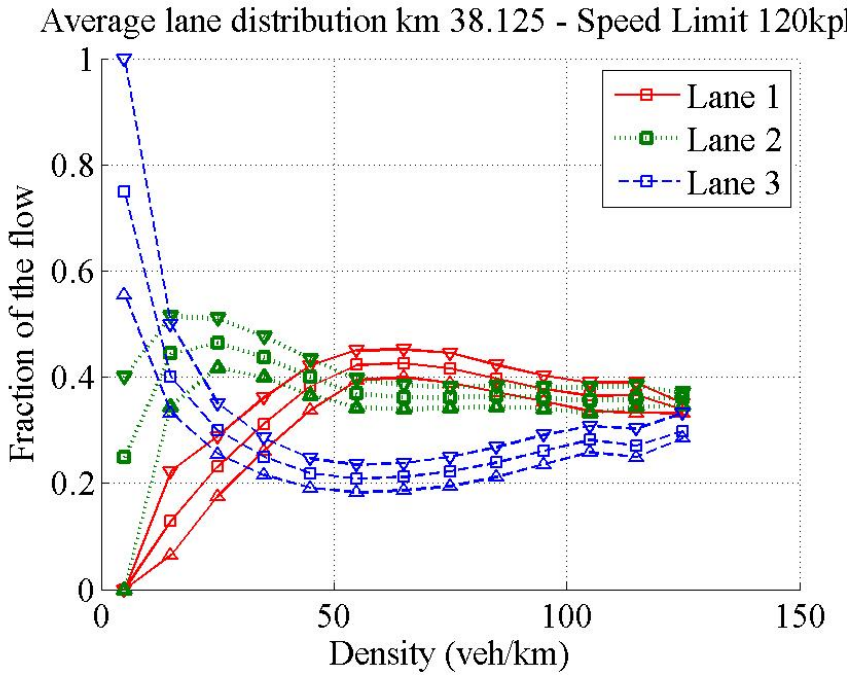

anwb
A9
8
A7
Noordwest
A10
Almere
A6
Amsterdam
Haarlem
A5
A27
A28
A1
A44
N206
N207
A2
A4
Den Haag
N 11
Utrecht
A12
A12
A13
A20
Oost
Rotterdam
A27
A2
A15
A15
Zuidwest
A29
A16
Zuidoost

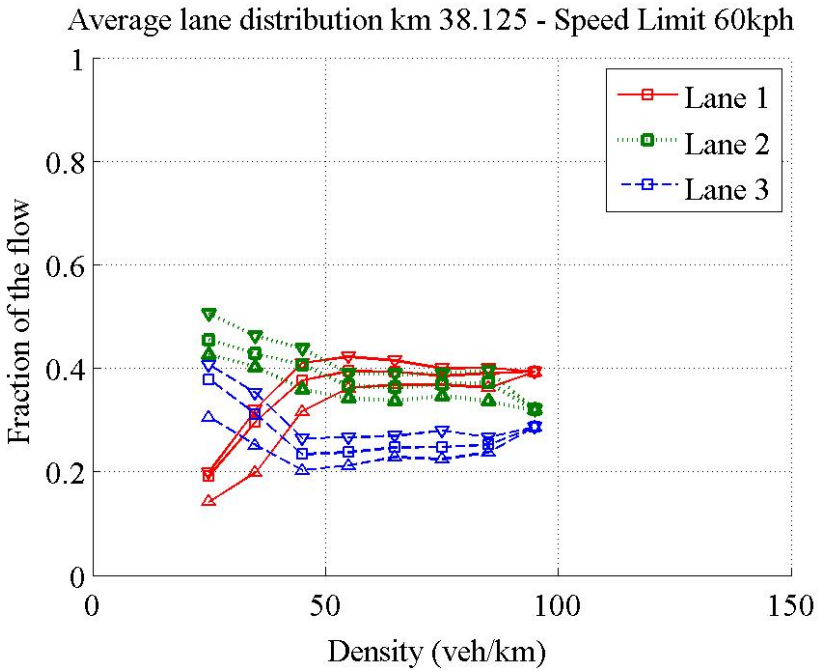
Lane Distribution





Influence of speed limit





Macroscopic Fundamental Diagram

- Removes all stochastic noise?
- Average flow and density in area
- Requires homogeneity

- Introduced Geroliminis (2008)

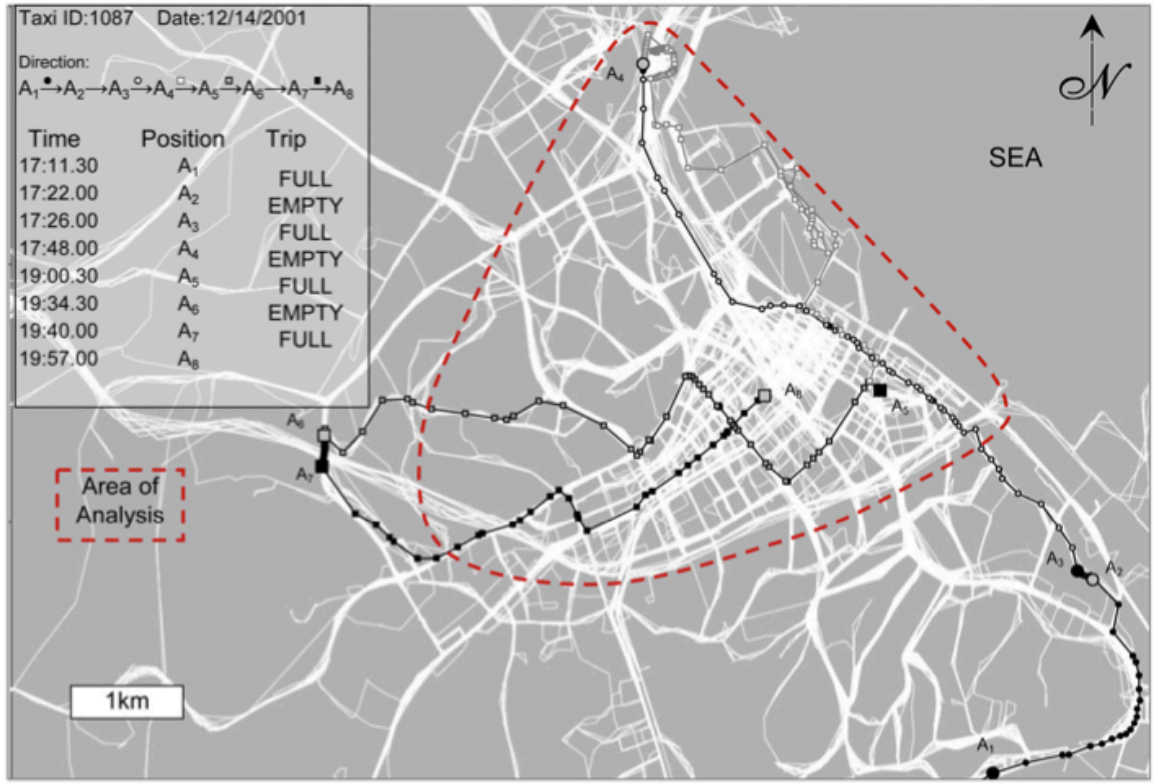
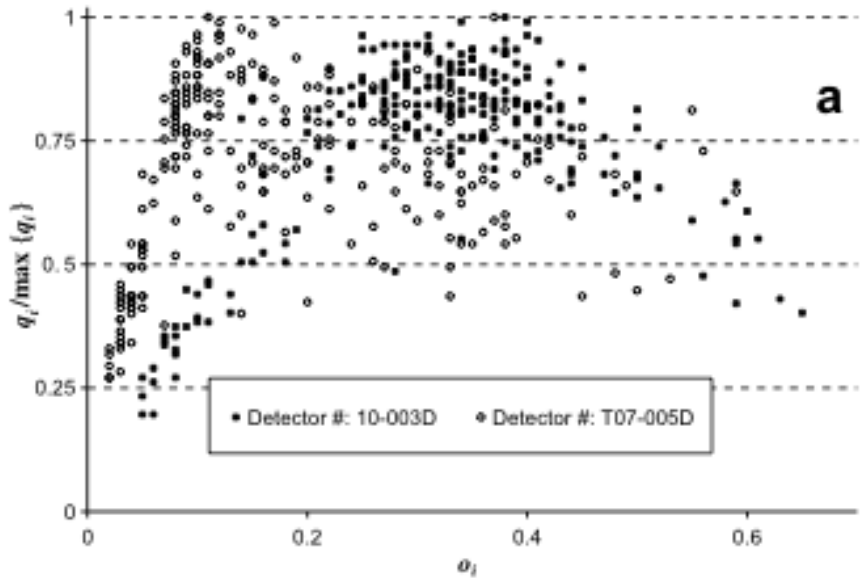
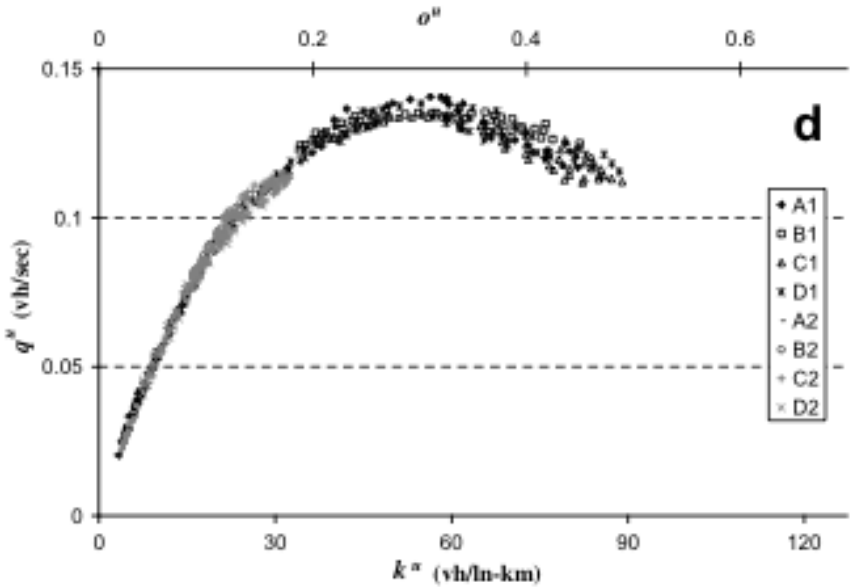


Fig. 5. Trajectory of taxi 1087, and area map (in white) produced by a superposition of all the taxi trajectories.

- Apparently quite good, but only with homogeneous networks






"I WAS HOPING TRAFFIC WOULD EASE UP
AFTER THE POLAR ICE CAP MELTED."