Macroscopic Fundamental Diagram (MFD)

Consider the street network in a neighborhood of a city as a reservoir holding cars. The outflow of vehicles reaching their destinations or exiting the neighborhood is a function of the number of vehicles accumulated in the reservoir. This relationship is an urban-scale law called the macroscopic fundamental diagram (MFD).

**Single Mode – Implications**

Simulation and experimental findings suggest that MFDs exist on the neighborhood-scale. They are based on the characteristics of the network and do not depend on demand.

**Control Application: San Francisco**

→ Aggregate traffic conditions monitored
→ Traffic signals on perimeter of neighborhood (CBD) control inflow so that accumulation never enters the congested phase

**Multiple Modes – Nairobi, Kenya**

Typical traffic congestion in Nairobi, Kenya

**Objectives**

→ Does an MFD exist for a network with heterogeneous modes?
→ Analyze the effect that multiple modes have on congestion.

**Current Application: Transport in Nairobi, Kenya**

How would provision of BRT affect overall mobility?

→ Network is non-uniform and sparse
→ Extreme congestion
→ Many modes: matatus (jitneys), buses, cars
→ Little signal control in the central business district

**Future Work: Probes to Monitor Traffic Congestion**

→ Can matatus be used as traffic probes?
→ Can perimeter control be used to increase people mobility by all modes?

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**Existence and Application of Urban-Scale Traffic Laws**

C. Chavis, E. Gonzales, N. Geroliminis, Y. Li, C. Daganzo

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**Goal:** Keep traffic conditions in a neighborhood near peak performance to maintain maximum rate of trips ending, thereby providing maximum accessibility.