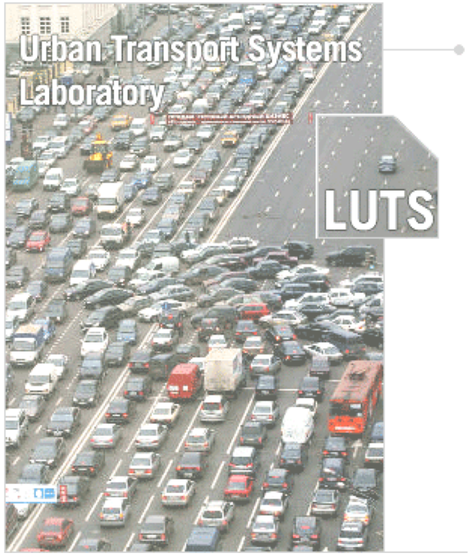
ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Traffic flow variables

Intro to traffic flow modeling and ITS

Prof. Nikolas Geroliminis



Welcome

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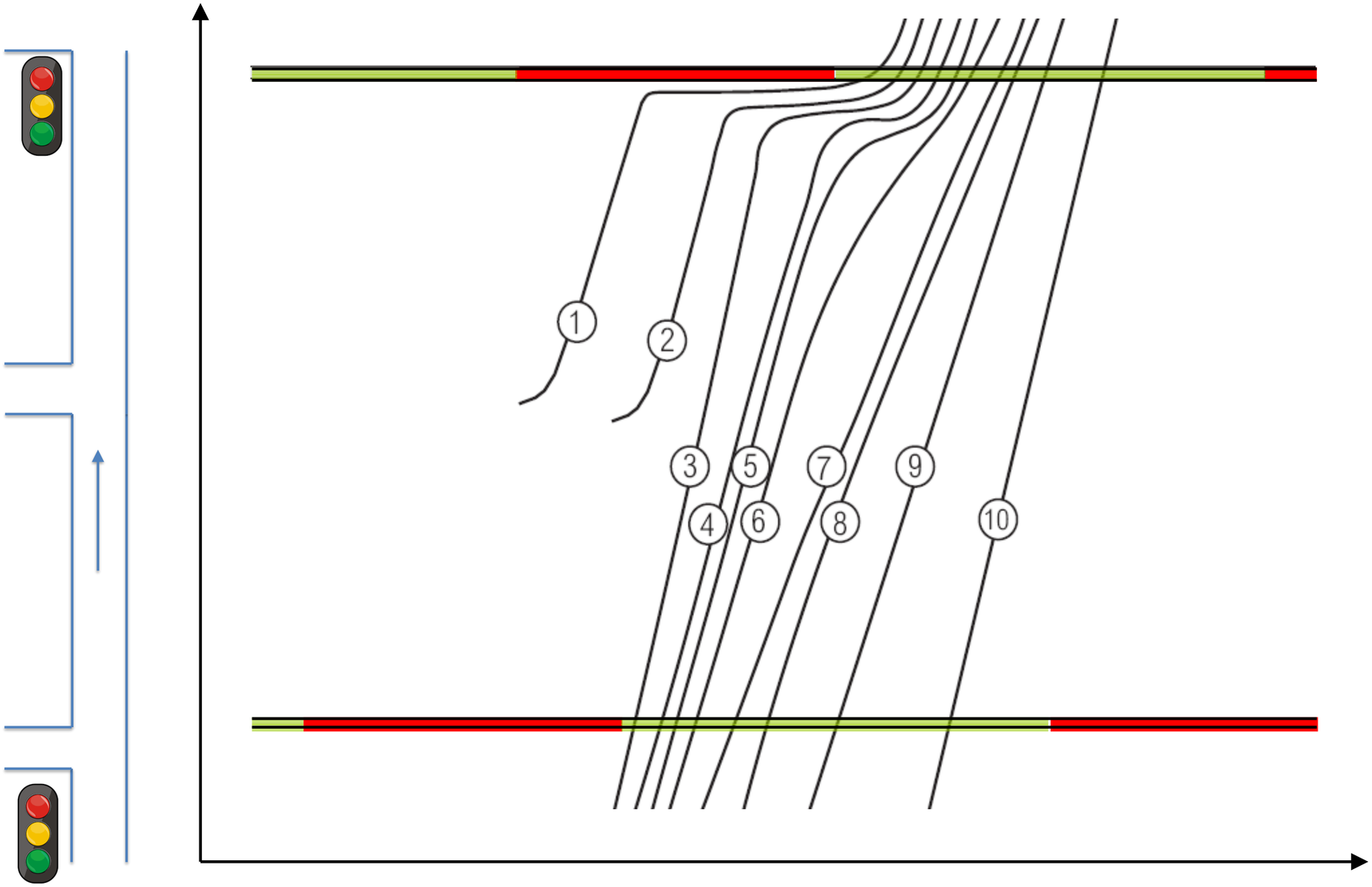
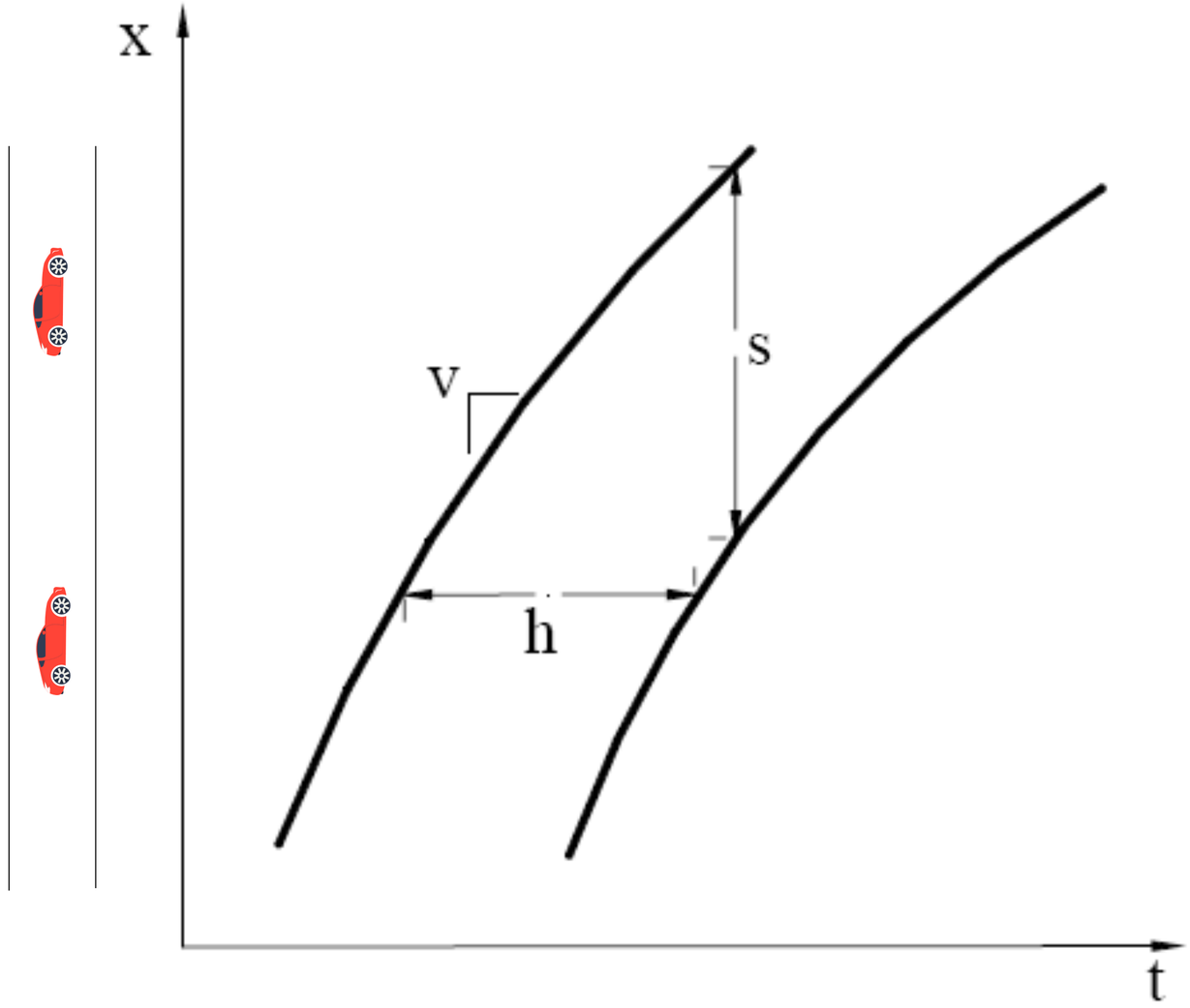
Week Outline

- Week 1.1
  - Traffic flow variables
  - Time-Space Diagram
  - Space-mean vs. time-mean definitions
  - Generalized Definitions of flow and density
- Week 1.2
  - Fundamental Diagram
- Week 1.3
  - Input-Output Diagrams

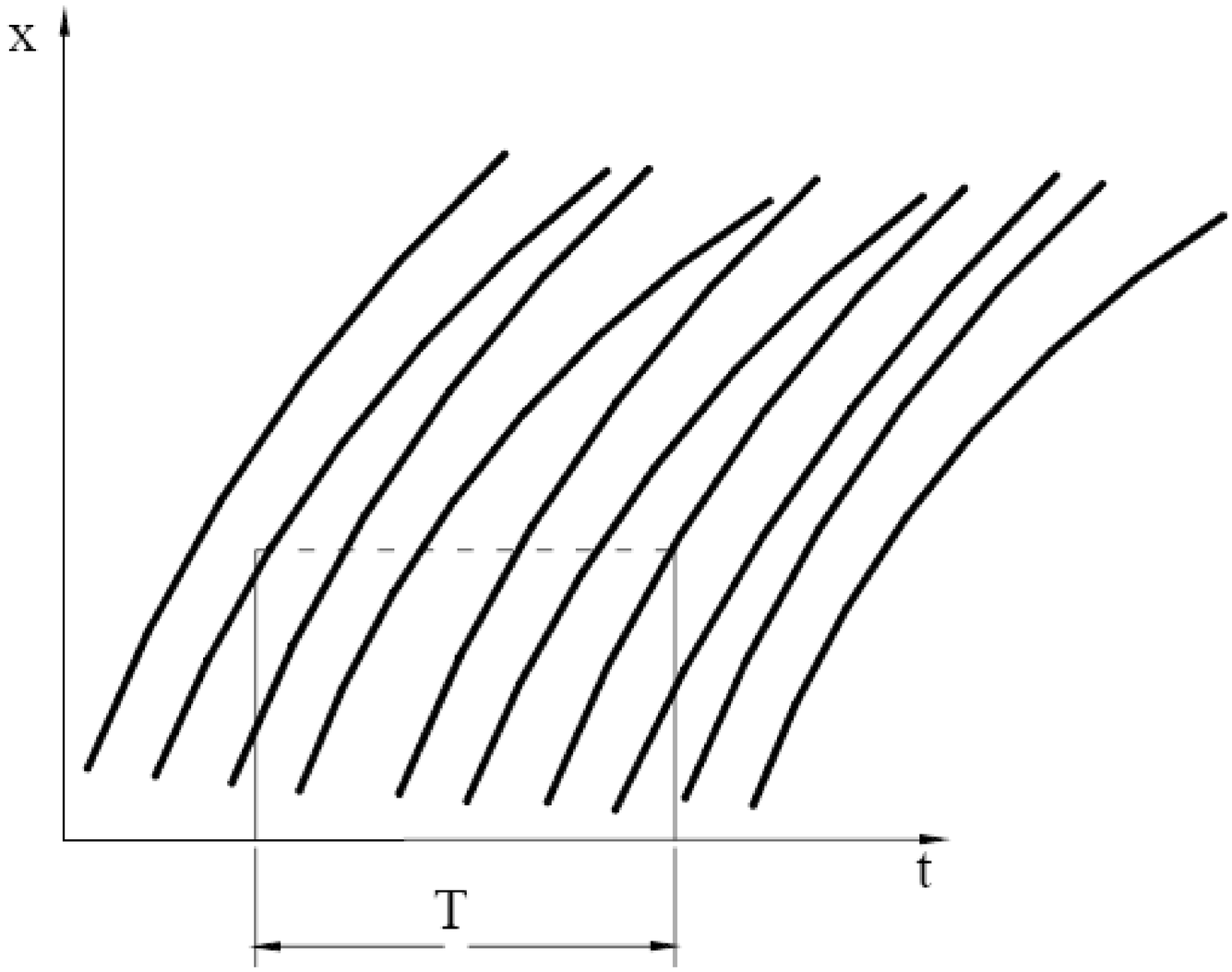
Time-Space Diagram



Headway and Spacing definitions

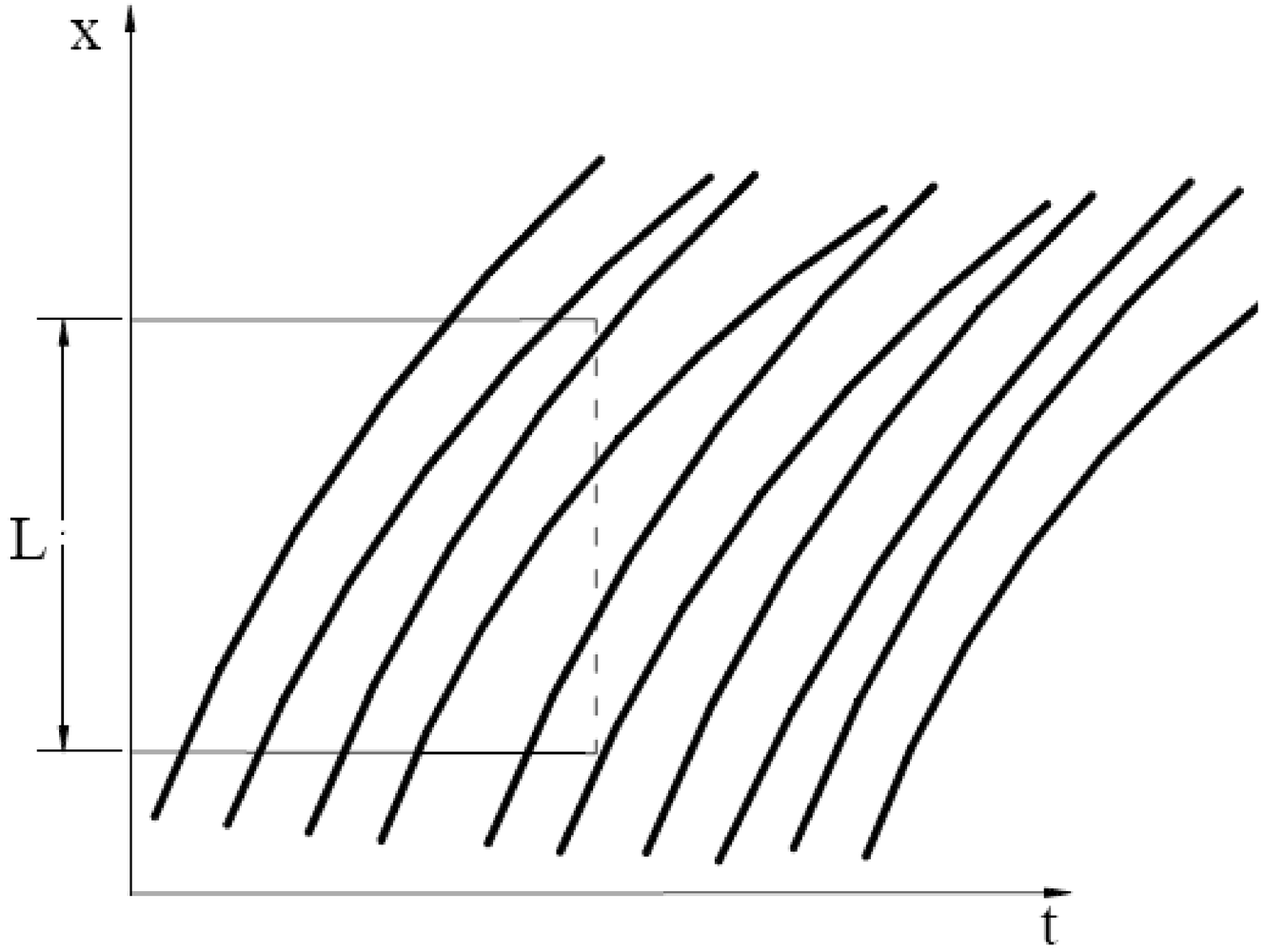


Flow definition



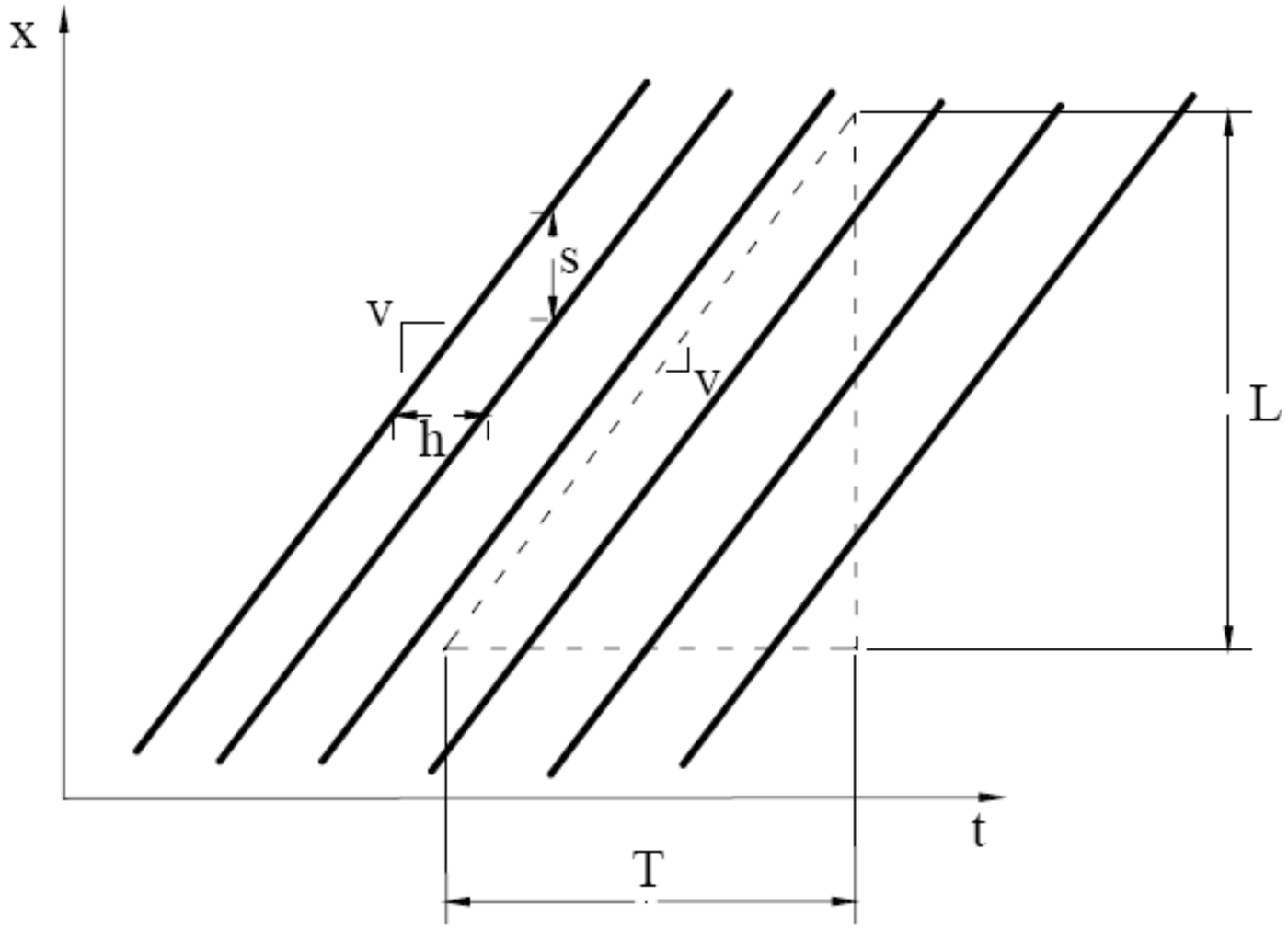
- Stationary observer at a specific location *x**

Density definition

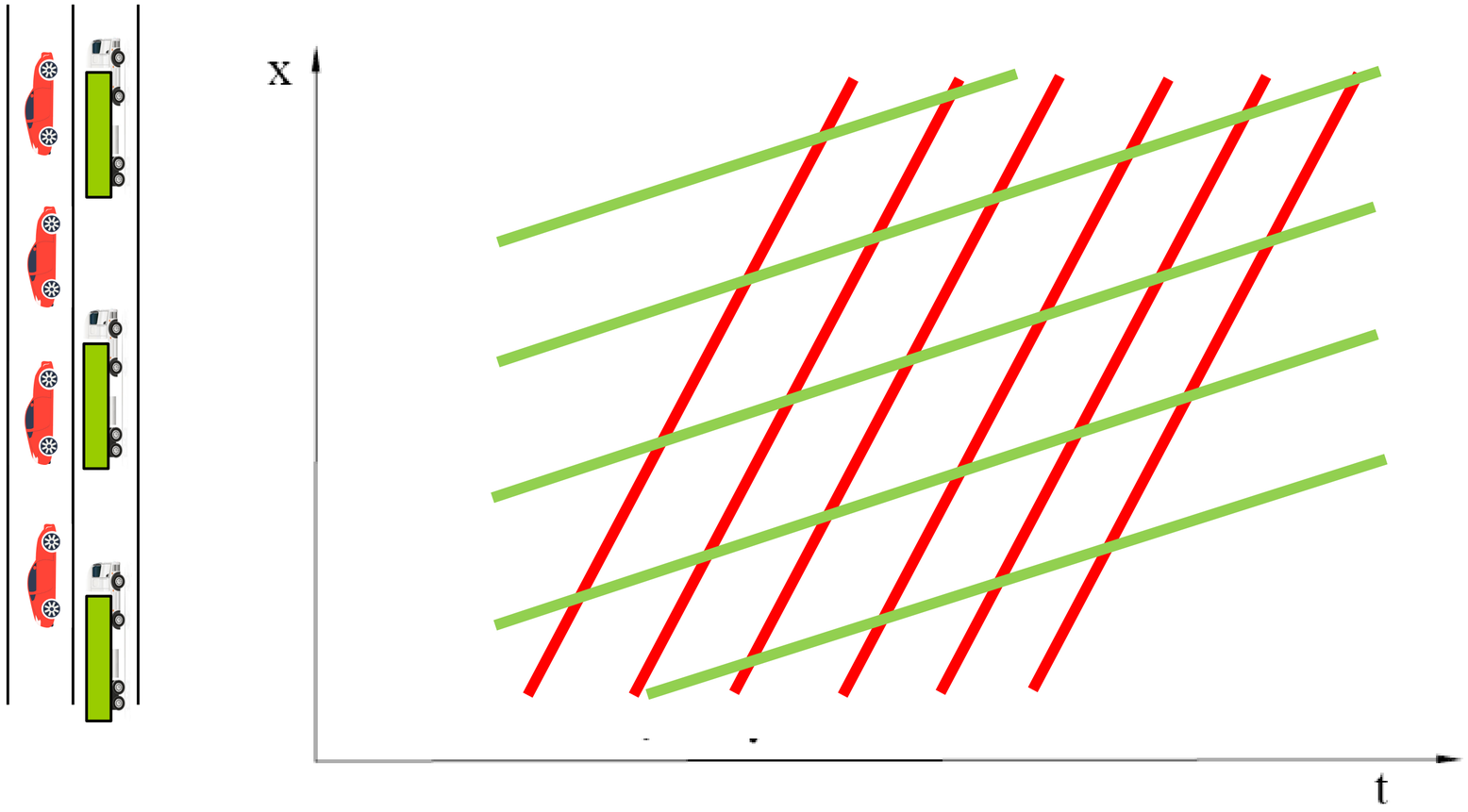


- Aerial Picture at a given time *t**

Relation between flow, density and speed

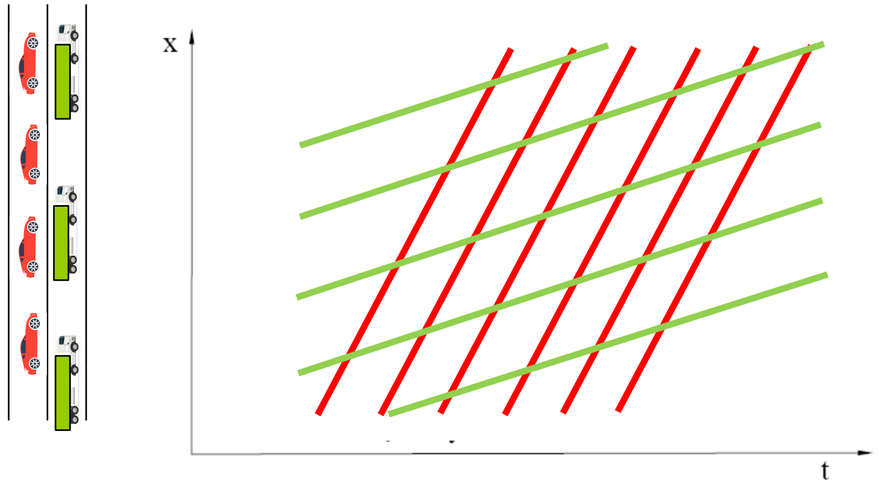


Groups of vehicles – Methods of observations



- **Stationary observer**
  - Fraction of trucks is
- **Aerial Photograph**
  - Fraction of trucks is

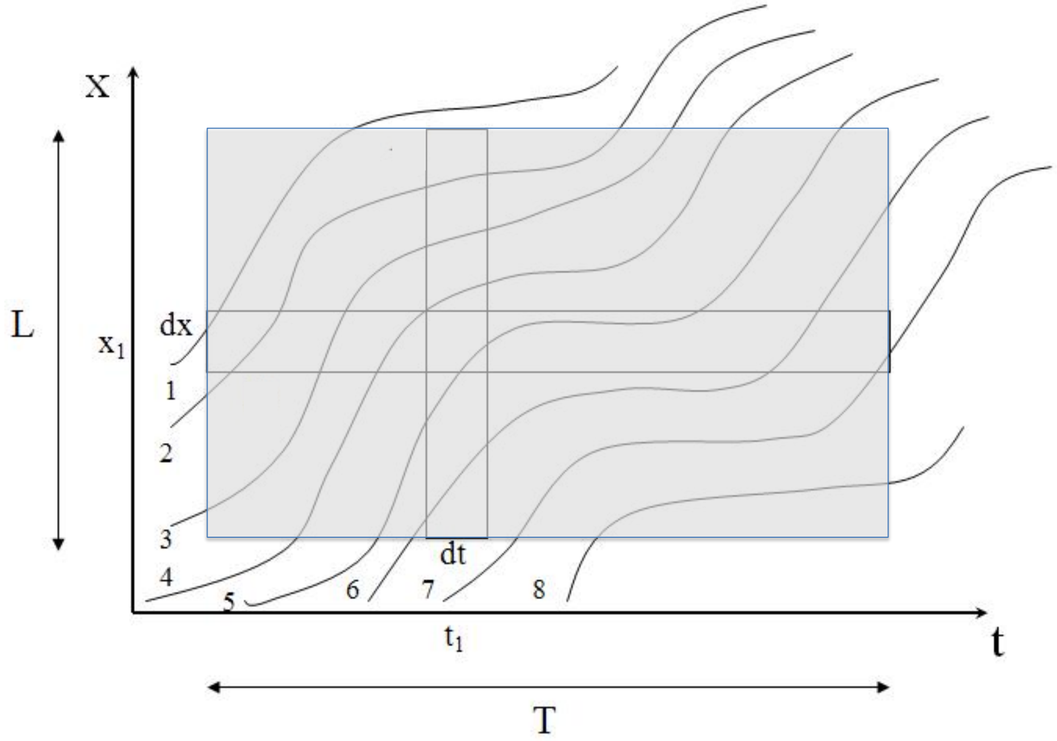
Space-mean and time-mean speed



$$v_{SMS} = \frac{k_T v_T + k_C v_C}{k_T + k_c} = \frac{\sum_i k_i v_i}{\sum_i k_i}$$

$$v_{TMS} = \frac{q_T v_T + q_C v_C}{q_T + q_c} = \frac{\sum_i q_i v_i}{\sum_i q_i}$$

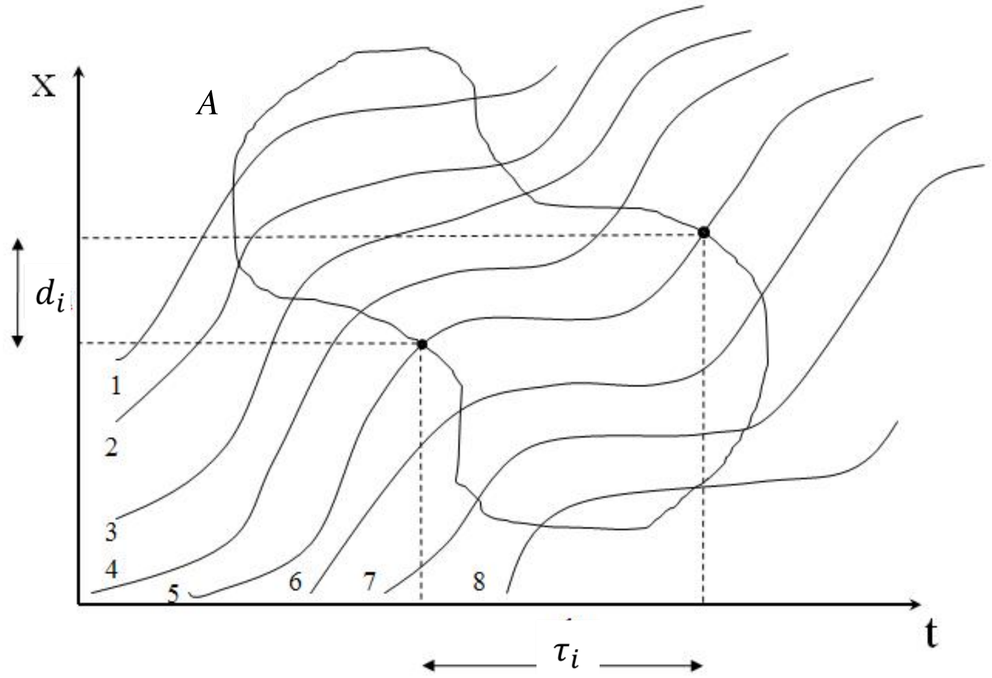
Generalized definitions of flow and density



VKT: Vehicle Km Travelled
VHT: Vehicle Hr Travelled

Based on Edie (1963)

Generalized definitions of flow and density



$$Q = \frac{\sum_i d_i}{|A|} = \frac{d(A)}{|A|} = \frac{VKT}{Area}$$

$$K = \frac{\sum_i \tau_i}{|A|} = \frac{\tau(A)}{|A|} = \frac{VHT}{Area}$$

$$V_{SMS} = \frac{d(A)}{\tau(A)} = \frac{VKT}{VHT}$$

VKT: Vehicle Km Travelled
VHT: Vehicle Hr Travelled

Based on Edie (1963)

Traffic flow variables - Summary