

10 MARZO

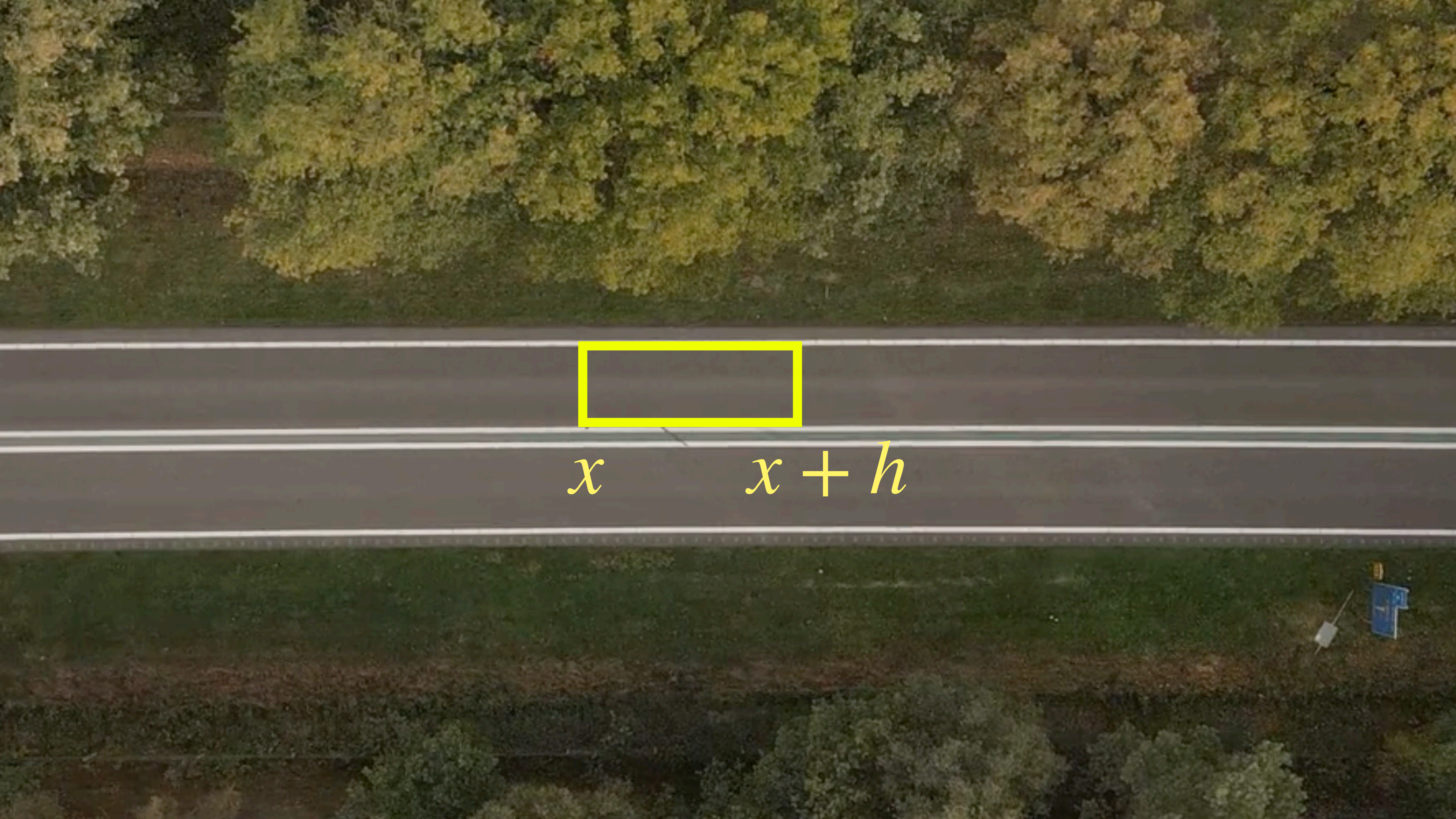
OPEN DAY LAUREE MAGISTRALI

MATEMATICA



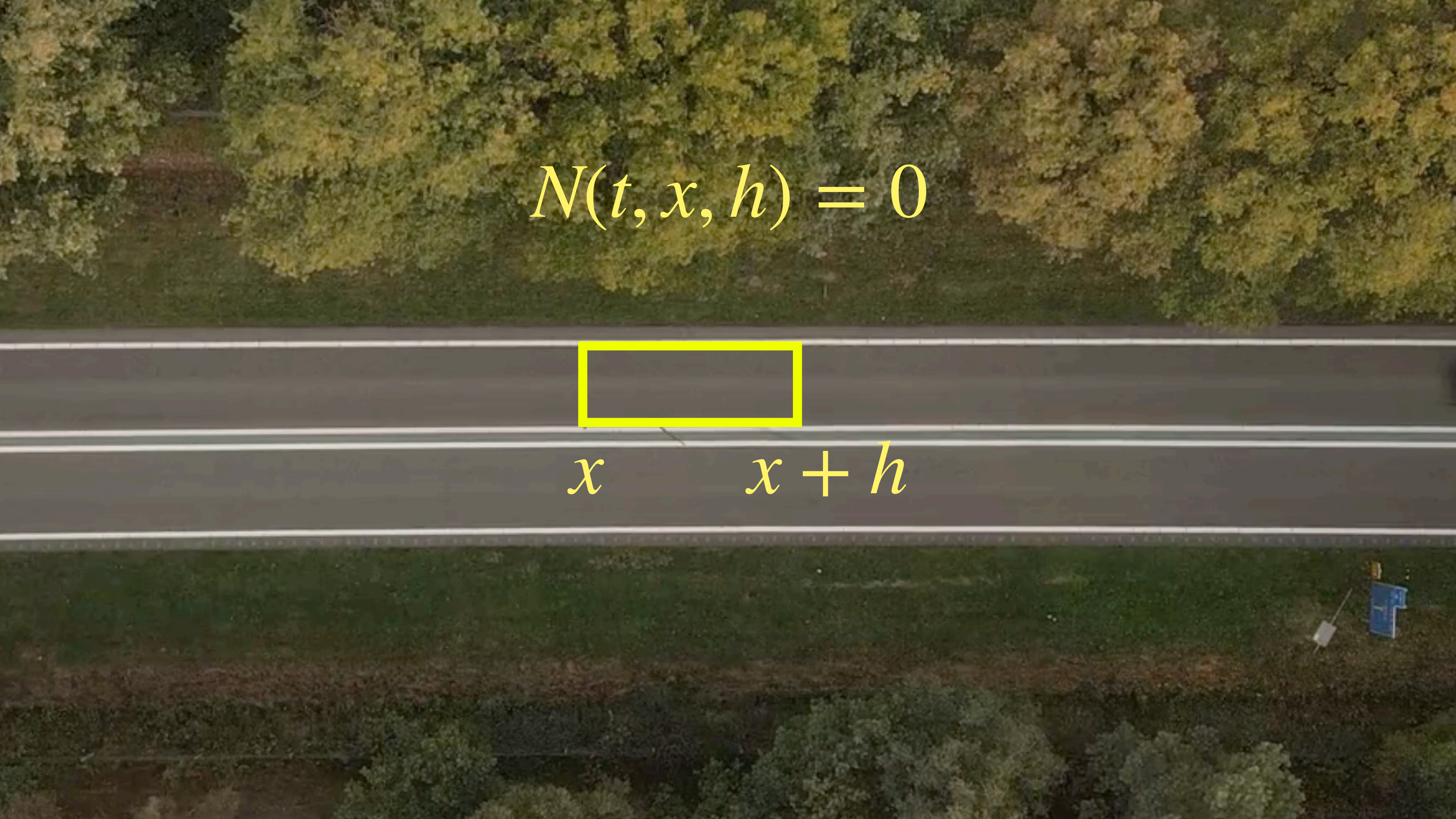
An aerial photograph of a two-lane asphalt road with white lane markings, running horizontally across the middle of the frame. The road is flanked by dense green and yellowish trees and foliage. In the upper right, a small paved area with a crosswalk is visible. In the lower right, a small blue object, possibly a trash can, sits on the grass. The text 'DENSITÀ DI AUTO?' is overlaid in large, bold, yellow capital letters across the center of the image.

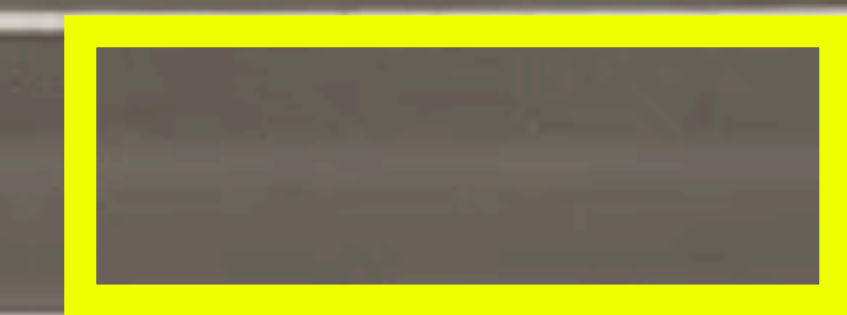
DENSITÀ DI AUTO?

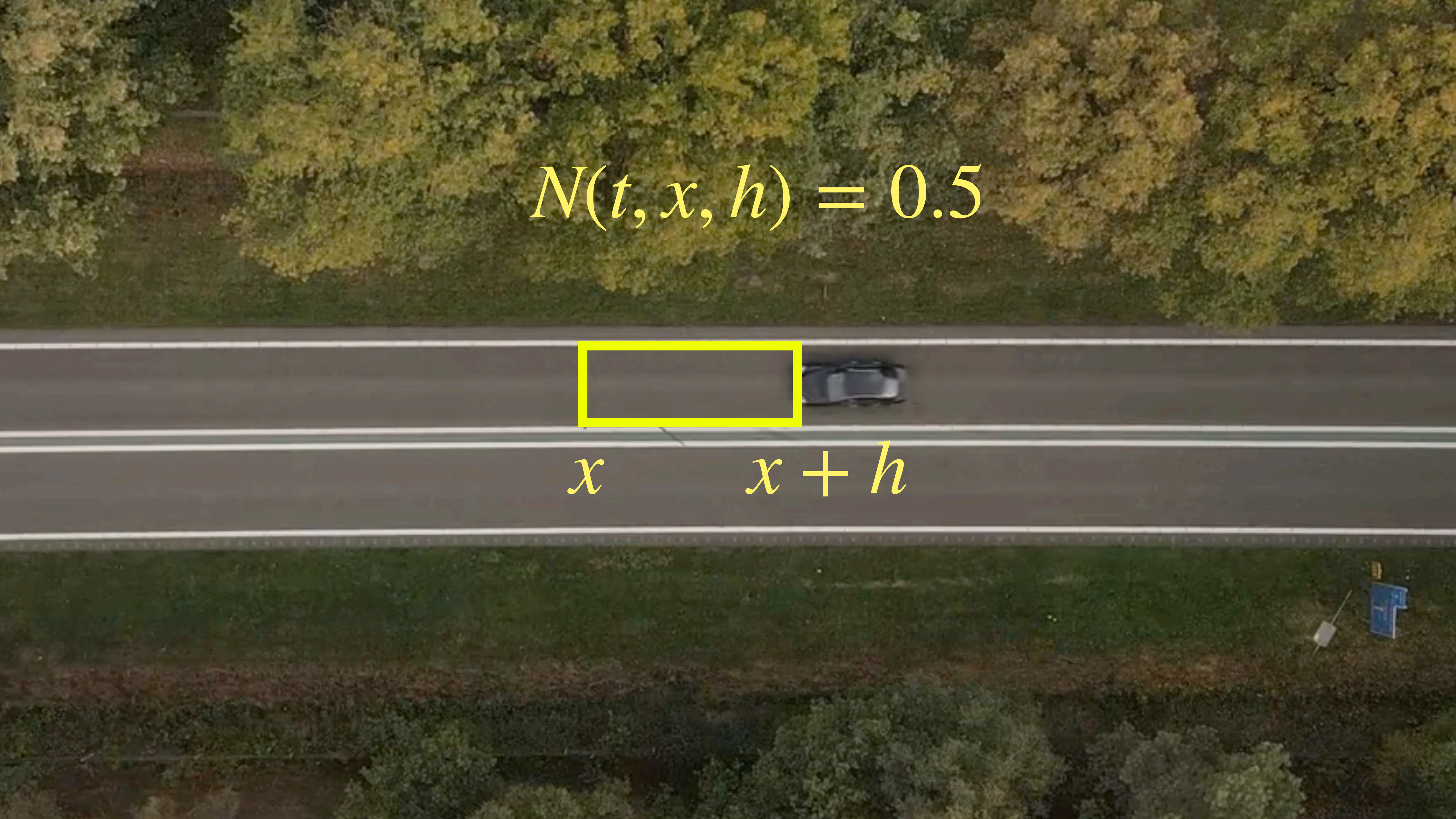


x

$x + h$

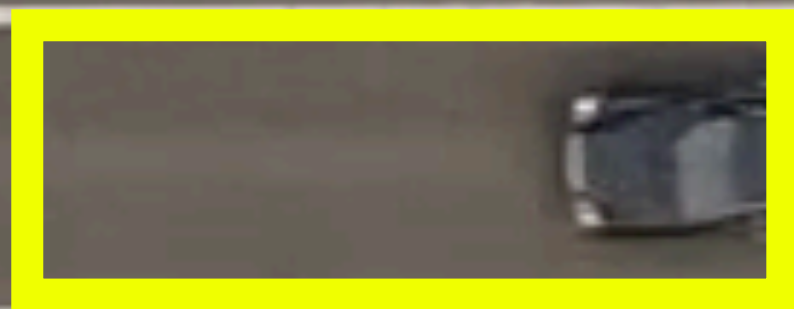
An aerial photograph of a two-lane road with white lane markings. A yellow rectangle is drawn on the road surface, spanning across both lanes. The background consists of green trees and grass on either side of the road.
$$N(t, x, h) = 0$$

 x $x + h$

An aerial photograph of a two-lane road. A dark-colored car is driving in the right lane. A yellow rectangular bounding box is drawn on the road, starting from the left edge of the car and extending to the right. The road is flanked by green trees and grass. The equation $N(t, x, h) = 0.5$ is overlaid in yellow text above the bounding box.
$$N(t, x, h) = 0.5$$

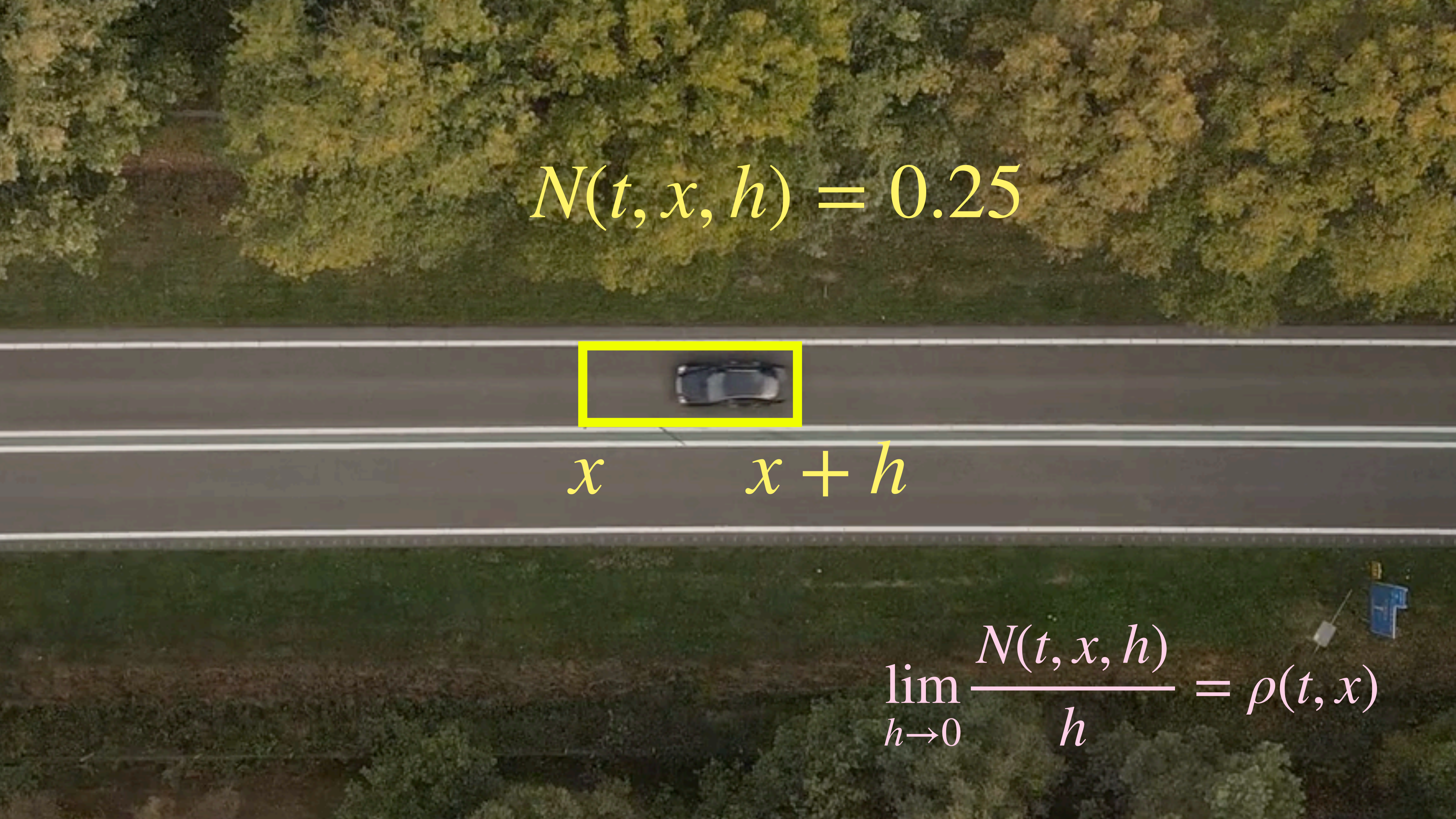
$$x \quad x + h$$

$$N(t, x, h) = 1$$



x

$x + h$

An aerial photograph of a two-lane road. A dark-colored car is positioned in the center of the road, enclosed within a bright yellow rectangular box. The road is flanked by green grass and trees. The mathematical notation $N(t, x, h) = 0.25$ is overlaid in yellow text above the car.
$$N(t, x, h) = 0.25$$

$$x \qquad x + h$$

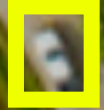
$$\lim_{h \rightarrow 0} \frac{N(t, x, h)}{h} = \rho(t, x)$$



Mancarsi — Coma_cose



la strada è solo una riga di matita
che trucca gli occhi alla pianura



LEGGI DI CONSERVAZIONE

$$\partial_t \rho + \partial_x (f(\rho)) = 0$$

DENSITÀ **FLUSSO**

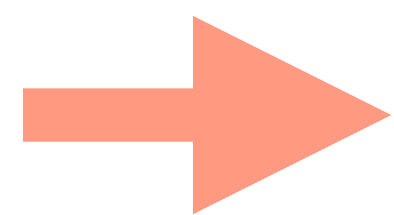
LEGGI DI CONSERVAZIONE

$$\partial_t \rho + \partial_x (f(\rho)) = 0$$

$$\frac{d}{dt} \int_a^b \rho(t, x) dx = - \int_a^b \partial_x f(\rho(t, x)) dx = \underbrace{f(\rho(t, a))}_{\text{FLUSSO ENTRANTE}} - \underbrace{f(\rho(t, b))}_{\text{FLUSSO USCENTE}}$$



a



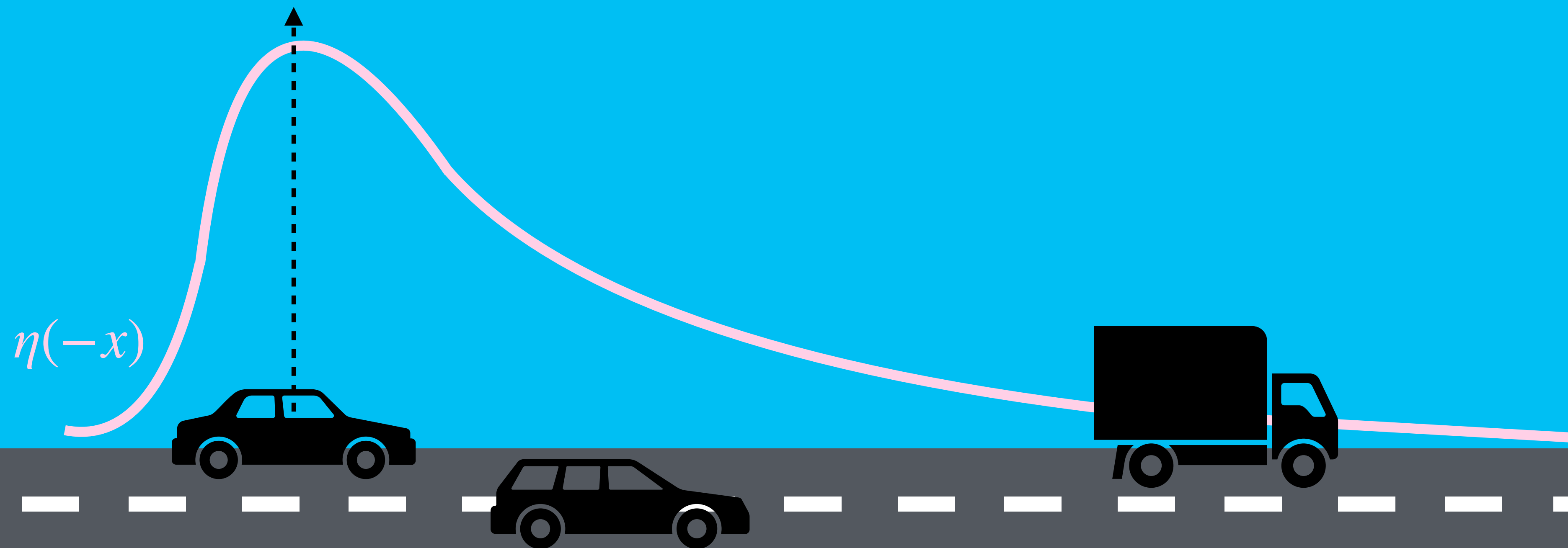
b

LEGGI DI CONSERVAZIONE NONLOCALI

$$\partial_t \rho + \partial_x(\rho \, \textcolor{brown}{v}(\rho)) = 0 \quad \longrightarrow \quad \partial_t \rho + \partial_x(\rho \, v(\rho * \textcolor{purple}{\eta})) = 0$$

VELOCITÀ

KERNEL



MODELLI DI TRAFFICO NONLOCALI MULTICLASSE

$$\begin{cases} \partial_t \rho_i + \partial_x (\rho_i v_i(t, x, \eta_{i1} * \rho_1, \dots, \eta_{in} * \rho_n)) = 0 & i = 1, \dots, n \\ \rho_i(0, x) = \rho_{o,i}(x) \end{cases}$$

ESISTE UNA
SOLUZIONE?

COME DIPENDE
DAI DATI
INIZIALI?

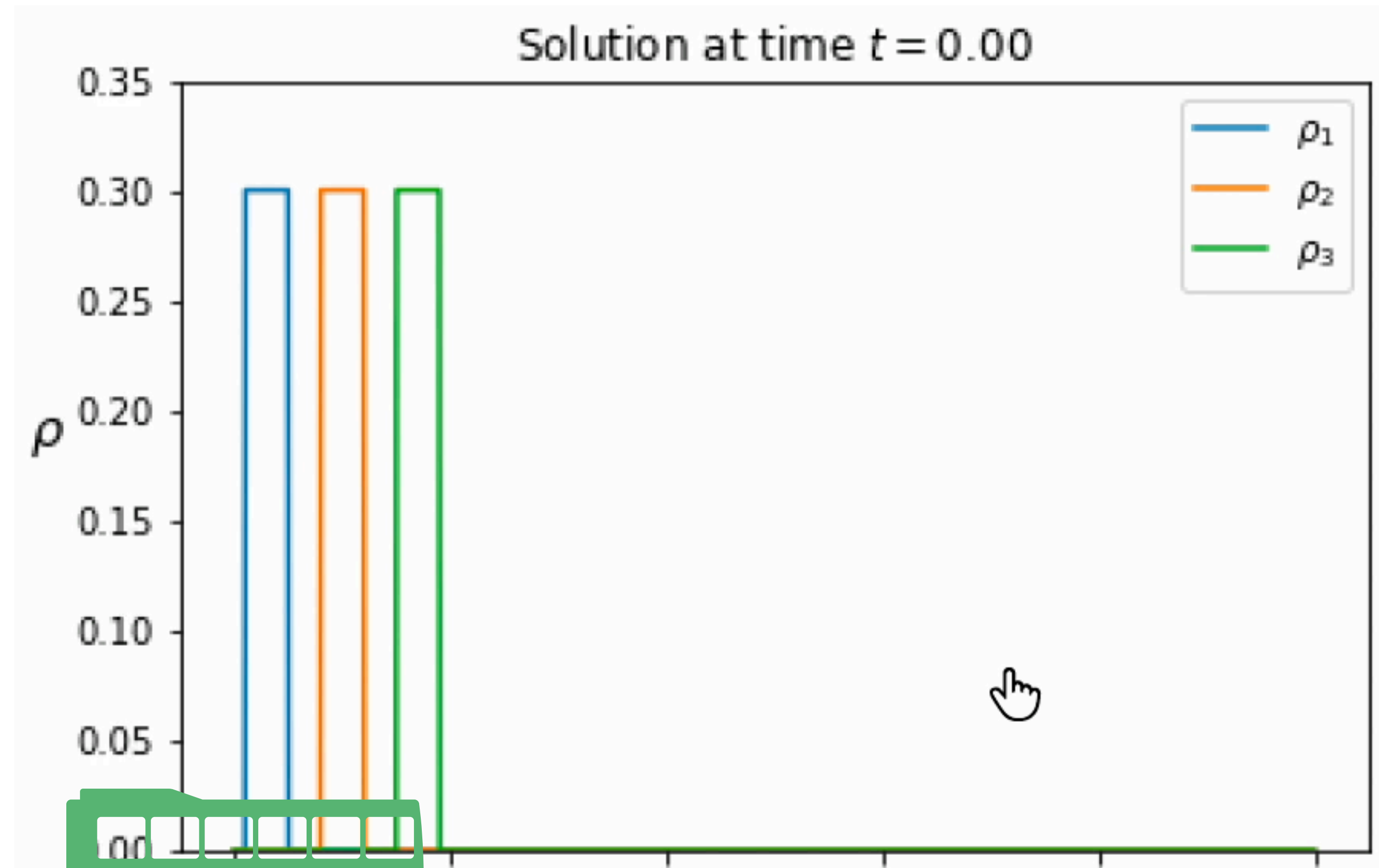
COME DIPENDE
DALLE
FUNZIONI
KERNEL?

LA SOLUZIONE
È UNICA?

COME DIPENDE
DALLE
VELOCITÀ?

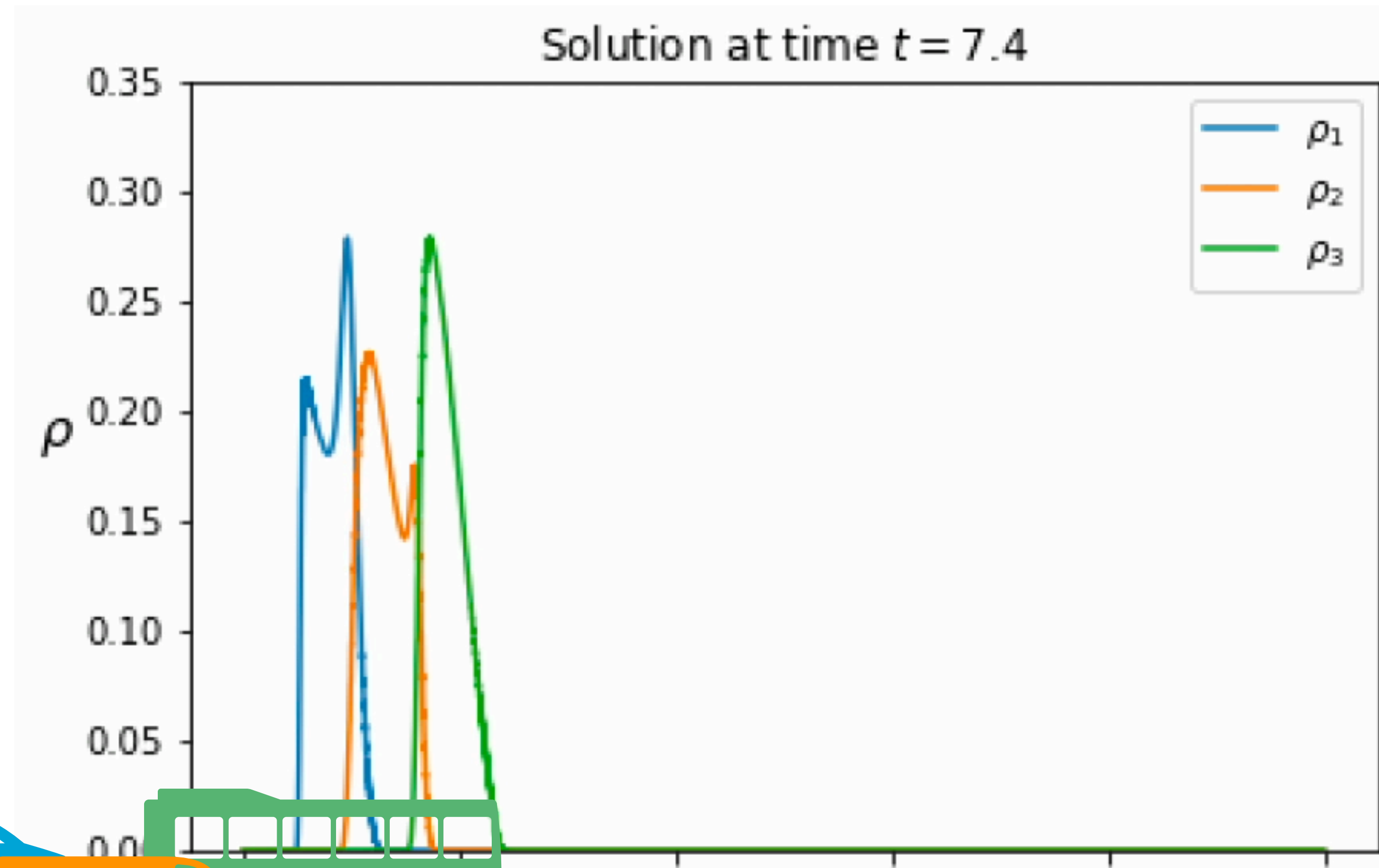
MODELLI DI TRAFFICO NONLOCALI MULTICLASSE

$$\begin{cases} \partial_t \rho_i + \partial_x (\rho_i v_i(t, x, \eta_{i1} * \rho_1, \dots, \eta_{in} * \rho_n)) = 0 & i = 1, \dots, n \\ \rho_i(0, x) = \rho_{o,i}(x) \end{cases}$$



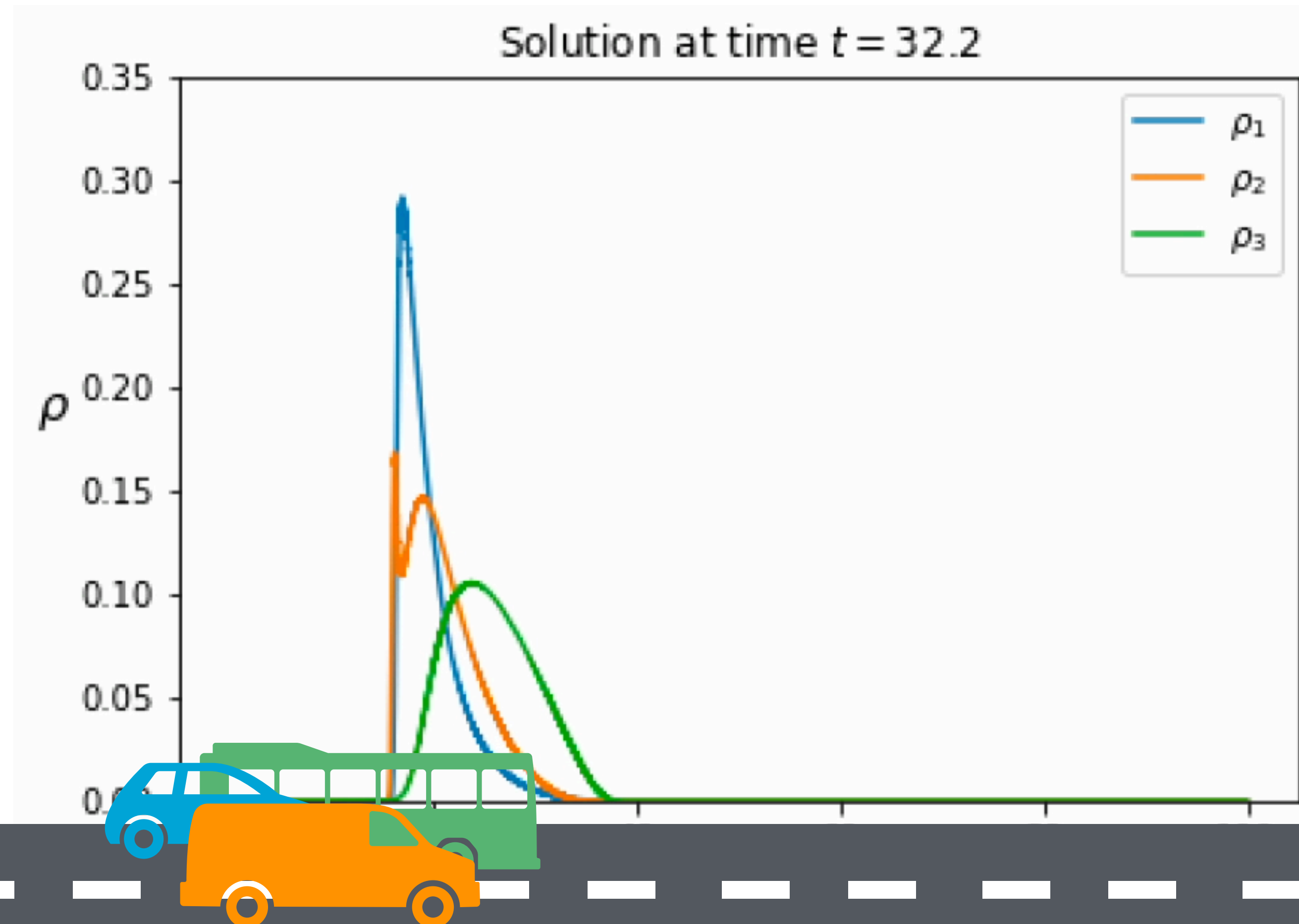
MODELLI DI TRAFFICO NONLOCALI MULTICLASSE

$$\begin{cases} \partial_t \rho_i + \partial_x (\rho_i v_i(t, x, \eta_{i1} * \rho_1, \dots, \eta_{in} * \rho_n)) = 0 & i = 1, \dots, n \\ \rho_i(0, x) = \rho_{o,i}(x) \end{cases}$$



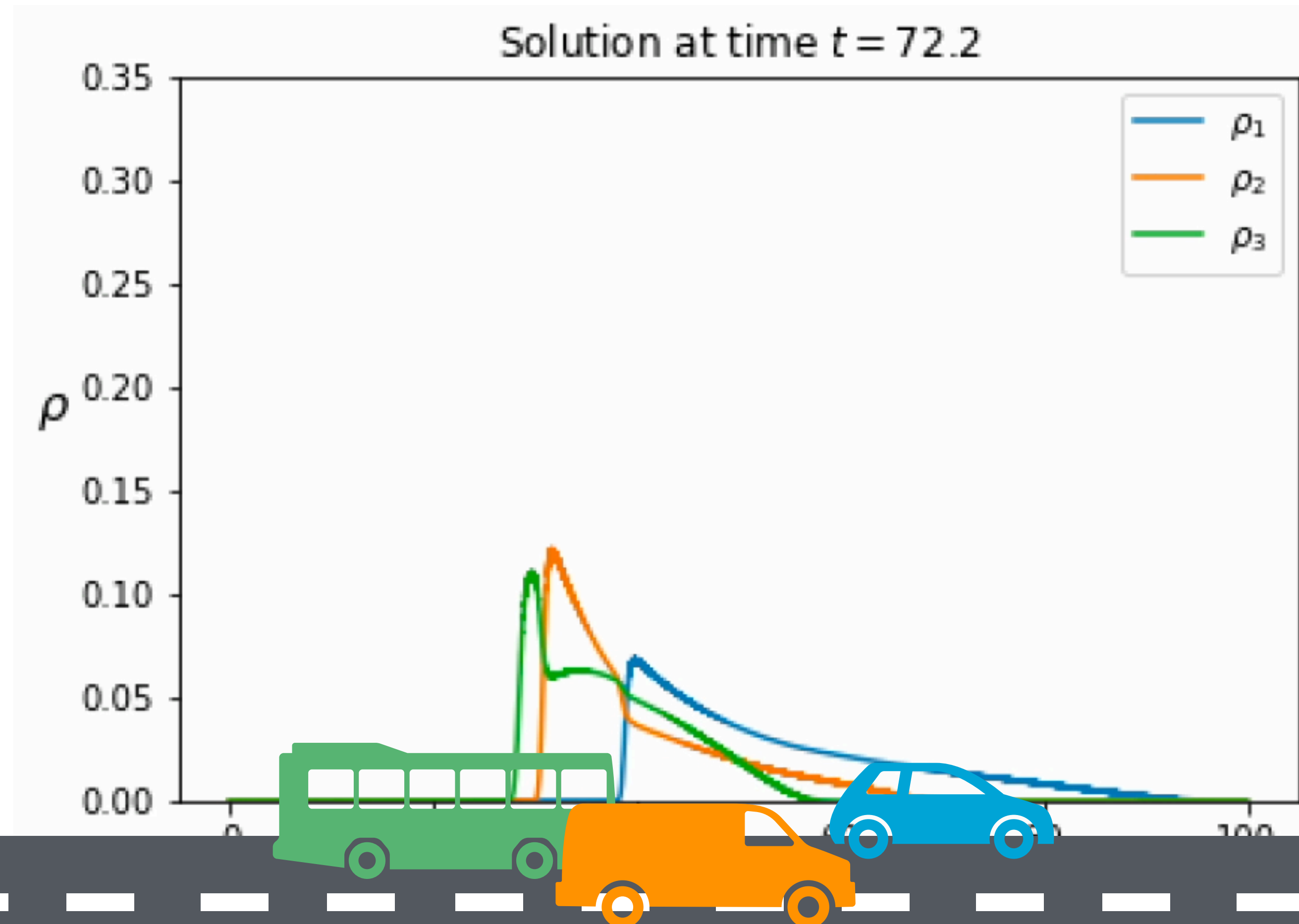
MODELLI DI TRAFFICO NONLOCALI MULTICLASSE

$$\begin{cases} \partial_t \rho_i + \partial_x (\rho_i v_i(t, x, \eta_{i1} * \rho_1, \dots, \eta_{in} * \rho_n)) = 0 & i = 1, \dots, n \\ \rho_i(0, x) = \rho_{o,i}(x) \end{cases}$$



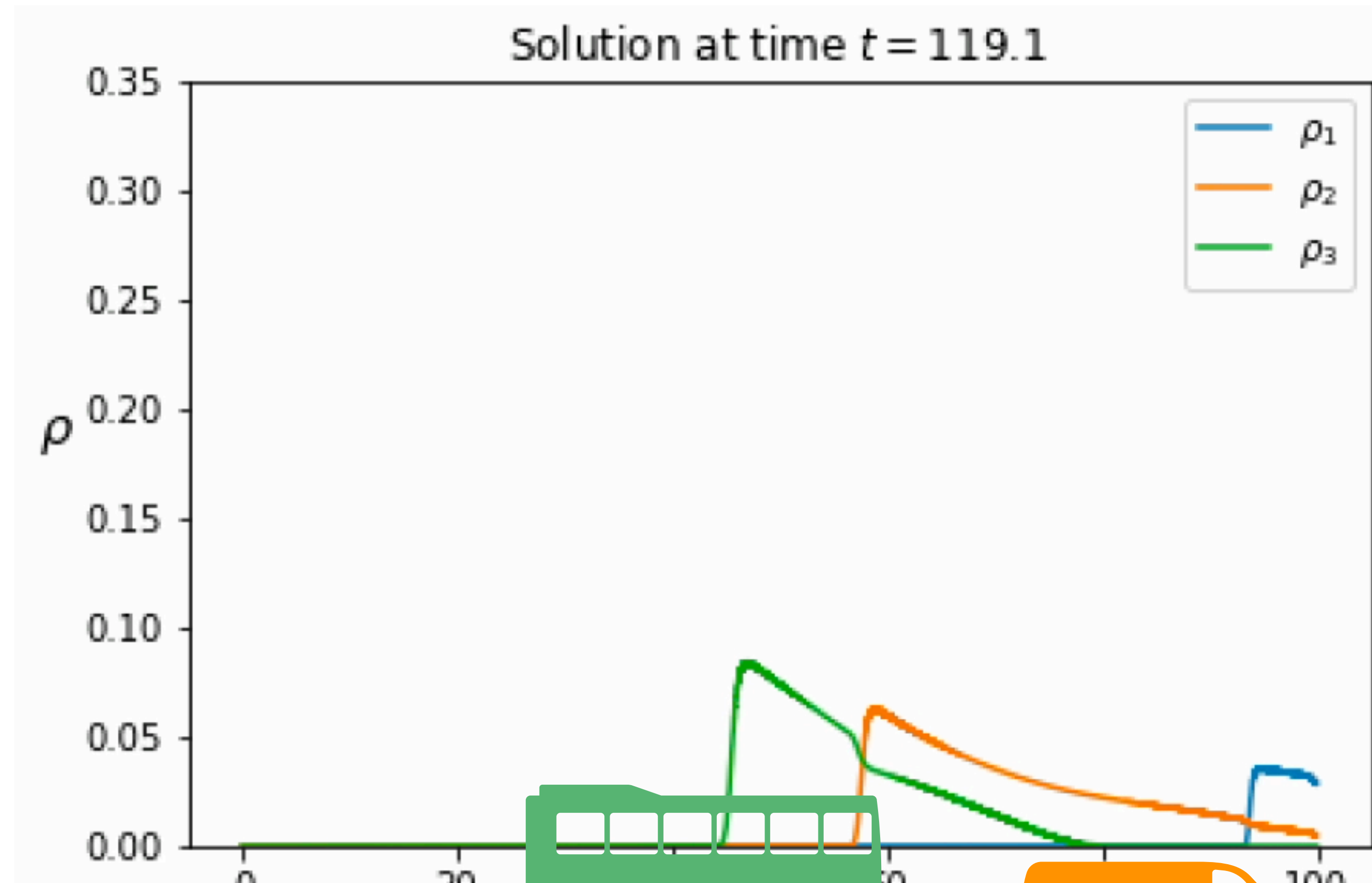
MODELLI DI TRAFFICO NONLOCALI MULTICLASSE

$$\begin{cases} \partial_t \rho_i + \partial_x (\rho_i v_i(t, x, \eta_{i1} * \rho_1, \dots, \eta_{in} * \rho_n)) = 0 & i = 1, \dots, n \\ \rho_i(0, x) = \rho_{o,i}(x) \end{cases}$$



MODELLI DI TRAFFICO NONLOCALI MULTICLASSE

$$\begin{cases} \partial_t \rho_i + \partial_x (\rho_i v_i(t, x, \eta_{i1} * \rho_1, \dots, \eta_{in} * \rho_n)) = 0 & i = 1, \dots, n \\ \rho_i(0, x) = \rho_{o,i}(x) \end{cases}$$



Limite nonlocale-locale

Problemi misti

**MODELLI NONLOCALI
E LOCALI?**

ALGORITMI NUMERICI?

CAMBIARE PARAMETRI?

Velocità

Kernel

**PROBLEMI DI
CONTROLLO?**

**REGOLARITÀ DELLE
SOLUZIONI?**

**PROBLEMI
AL BORDO?**

LEGGI DI BILANCIO?

Grazie mille!

c.nocita@campus.unimib.it

UFFICIO 2115