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# Errata of the textbook “Traffic Flow Dynamics – Data, Models, and Simulation”

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In the following, we list only errors relating to the content.

- **Chapter 3.1, page 14:** In the last term, nominator and denominator are permuted. The correct equation reads

$$T_\alpha = t_\alpha^0 - t_{\alpha-1}^1 = \Delta t_\alpha - \frac{l_{\alpha-1}}{v_{\alpha-1}} \quad (3.4)$$

- **Chapter 3.3, page 19:** Equation (3.20) is incorrect. The correct equation reads

$$\rho = \frac{Q}{V} \left( \frac{1}{1 + \frac{\sigma_V}{V} Q \sigma_{\Delta t} r_{v_\alpha, \Delta t_\alpha}} \right) \quad (3.4)$$

which can also be approximated by

$$\rho = \frac{Q}{V} \left( \frac{1}{1 + \frac{\sigma_V}{V} \frac{\sigma_Q}{Q} r_{v_\alpha, \Delta t_\alpha}} \right) \quad (3.4)$$

where  $\sigma_{\Delta t}$  is the standard deviation of the (vehicle-to-vehicle) time headways.

- **Chapter 7.2, page 74, and Problem 7.6:** Equation (7.16) is only valid if the effective density  $\rho_k$  of cell  $k$  is defined using the downstream number of lanes as reference,  $\rho_k^{\text{tot}} = I_{\text{down}} \rho_k$ .
- **Parameter disacussion of Payne’s model on p. 139:** The parameter  $c_0$  is of the order of +10 m/s, not  $\pm 10$  m/s.
- **Chapter 8.3.2, page 86, Eq. (8.9):** Replace  $Q_e(\rho_1)$  by  $Q_e(\rho_2)$  and vice versa
- **Chapter 9.5, page 146:** There are sign errors in Equation (9.31): The correct equation reads

$$S_{\text{inh}} = -\frac{Q^2}{\rho I} \frac{dI}{dx} + \frac{Q \nu_{\text{rmp}}}{\rho} + \rho A_{\text{rmp}}. \quad (9.31)$$

- **Chapter 9.5.5, page 152:** Spurious “S” at the beginning of the text below Eq. (9.45)
- **Solutions to Problem 9.5, page 455:** In the last equation of this solution, there are sign errors related to that of Chapter 9.5: The right-hand side of this equation should read

$$\frac{\rho V_e^* - Q}{\tau} - \frac{Q^2}{\rho I} \frac{dI}{dx} + \frac{Q \nu_{\text{rmp}}}{\rho} + \rho A_{\text{rmp}}.$$

- **Chapter 9.5.4, page 148:** “*velocity!characteristic*” should read “*characteristic velocity*”.
- **Equation (9.36), p. 150:** The layout of the matrix on the right-hand side is misleading. The matrix component  $C_{21}$  is given by  $-V^2 + \frac{\partial P}{\partial \rho}$ , and  $C_{22}$  by  $2V + \frac{\partial P}{\partial Q}$ .
- **Chapter 10.8, page 176:** Replace  $\frac{\partial V(x,t)}{\partial t}t$  by  $\frac{\partial V(x,t)}{\partial t}T$  in the second line of Eq. (10.29).
- **Chapter 11.1, page 182:** replace “ $\geq$ ” by “ $=$ ” in Eq. (11.3)
- **Table 11.2, page 190:** Typical acceleration in city traffic are  $1.5 \text{ m/s}^2$ , not  $1.0 \text{ m/s}^2$ . Moreover, the typical parameter values of this table are valid for cars, only. On freeways/highways, trucks (and their drivers) are characterized by a desired speed of  $80 \text{ km/h}$ . In any scenario, the time-gap parameter of trucks is of the order of  $2 \text{ s}$ , and the acceleration and comfortable deceleration parameters are somewhat lower than that for cars. Furthermore, the IDM can also be applied to other “self-driven agents” such as pedestrians as shown in the updated table below:

Parameter	Cars	Cars	Trucks	Pedestrians
	Freeway	City	Freeway	Single File
Desired speed $v_0$	120 km/h	54 km/h	80 km/h	5 km/h
Time gap $T$	1.0 s	1.0 s	1.8 s	0.8 s
Minimum gap $s_0$	2 m	2 m	3 m	0.2 m
Acceleration exponent $\delta$	4	4	4	1
Acceleration $a$	$1.0 \text{ m/s}^2$	$1.5 \text{ m/s}^2$	$0.5 \text{ m/s}^2$	$1.5 \text{ m/s}^2$
Comfortable deceleration $b$	$1.5 \text{ m/s}^2$	$2.0 \text{ m/s}^2$	$1.0 \text{ m/s}^2$	$2.0 \text{ m/s}^2$

- **Equations (11.23), (11.24), page 197:** The second lines of the rhs. of these equations are misleading. The parenthesis does not enclose the argument of the free-acceleration function but is a multiplicative factor: Replace  $a_{\text{free}}$  by  $a_{\text{free}}(v)$  in these equations, particularly, the second line of the rhs. of (11.23) reads  $a_{\text{free}}(v) (1 - z^{(2a)/a_{\text{free}}(v)})$ .
- **Figure 11.10, p. 201:** In the city scenario (right column), the acceleration parameter was set  $a = 1.5 \text{ m/s}^2$  while the value in Table 11.2 is set to  $a = 1.0 \text{ m/s}^2$ . Since the higher value is more realistic for city traffic, it should be changed in the second data column of the table to this value.
- **Equation (15.38), page 274:** The layout of the matrix (first factor on the lhs.) is misleading. Its 21-component reads  $-a_s$ , and its 22 component  $\lambda - (a_v + a_{v_l} e_i k)$ .
- **First sentence of last paragraph of p. 330:** The downstream detector is located at  $x_d = 481.8 \text{ km}$ , not  $422.2 \text{ km}$ .