

Traffic Flow Dynamics

Data, Models, and Simulation Errata of the First Edition (2013)

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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 ρ_k of cell k is defined using the downstream number of lanes as reference, $\rho_k^{\text{tot}} = I_{\text{down}} \rho_k$.
- **Parameter discussion of Payne's model on p. 139:** The parameter c_0 is of the order of +10 m/s, not ± 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

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

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- **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 accelerations in city traffic are 1.5 m/s^2 , not 1.0 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 km/h . In any scenario, the time-gap parameter of trucks is of the order of 2 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 Freeway	Cars City	Trucks Freeway	Pedestrians 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 δ	4	4	4	1
Acceleration a	1.0 m/s^2	1.5 m/s^2	0.5 m/s^2	1.5 m/s^2
Comfortable deceleration b	1.5 m/s^2	2.0 m/s^2	1.0 m/s^2	2.0 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_{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 $x_d = 481.8$ km, not 422.2 km.