

# Corrections to the book *Stability and Boundary Stabilization of 1-D Hyperbolic Systems*

April 28, 2023

1. Page 3, line 8: replace “ $\partial\psi/\partial Y$ ” by “ $\partial\psi/\partial\mathbf{Y}$ ”.
2. Page 4, line 9 : replace “ $\partial Y$ ” by “ $\partial\mathbf{Y}$ ” in the expression of  $B(x)$ .
3. Page 22, line 1: replace “ $P(t, L)$ ” by “ $H(t, L) - Z(L)$ ”. The correct boundary condition is

$$H(t, L) - Z(L) = \frac{P_a}{\rho g}.$$

4. Page 30, line -3: replace “ $R_1 + R_2$ ” by “ $R_1 + R_3$ ” in the expression of  $\Lambda(\mathbf{R})$ .
5. Page 30, the boundary condition “ $dL/dt = V(t, L)$ ” is missing from equation (1.43). The corrected boundary condition (1.43) is:

$$m \frac{d^2 L}{dt^2} = F - s_p P(\varrho(t, L)), \quad \frac{dL}{dt} = V(t, L).$$

6. Page 37. Everywhere in this page “ $B$ ” should be “ $B^*$ ”.
7. Page 92, equation (3.23): “ $z_i$ ” should read “ $z_\ell$ ” (twice).
8. Page 100, line 5: “ $R_\ell$ ” should be replaced by “ $R_L$ ” in the expressions of “ $I^*$ ” and “ $V^*$ ” (three times).
9. Page 103, line 9: “the coefficients  $\beta_{ik}$  and  $\gamma_{ik}$ ” should be replaced by “the coefficients  $\alpha_{ij}$ ,  $\beta_{ik}$  and  $\gamma_{ik}$ ”.
10. Page 114, line -11: in this inequation the first “ $\lambda_1^B$ ” should be replaced by “ $\lambda_1^A$ ”. The correct expression is

$$T > \frac{L}{\lambda_2^A} - \frac{L}{\lambda_1^A} \approx 56 \text{ s} > \frac{L}{\lambda_2^B} - \frac{L}{\lambda_1^B} \approx 44 \text{ s}.$$

11. Page 138, equation (5.21): replace “ $\text{diag}\Lambda^{-1}(\mathbf{R})\mathbf{R}_t$ ” by “ $\text{diag}[\Lambda'(\mathbf{R})\mathbf{R}_t]$ ”.  
(The definition of “ $\text{diag}[\Lambda'(\mathbf{R})\mathbf{R}_t]$ ” is given page 125).

12. Page 140, “diag” is missing from the right-hand side of equation (4.80).  
The corrected equation (4.80) is:

$$\mathcal{T}_2 \triangleq \int_0^L \left( \mathbf{R}^\top P(\mu x) \text{diag}[\Lambda'(\mathbf{R})\mathbf{R}_x] \mathbf{R} \right) dx.$$

13. Page 141, “diag” is missing from the right-hand side of equation (4.86).  
The corrected equation (4.86) is:

$$\mathbf{R}_{tt} = \Lambda(\mathbf{R})(\Lambda(\mathbf{R})\mathbf{R}_x)_x + \text{diag}[\Lambda'(\mathbf{R})(\Lambda(\mathbf{R})\mathbf{R}_x)] \mathbf{R}_x.$$

14. Page 161, line 7. The minus sign is misplaced. The correct writing is:

$$-\mathbf{W}_1 \triangleq [\mathbf{R}^\top Q(x)\Lambda(x)\mathbf{R}]_0^L.$$

15. Page 177, line 4. “Theorem 5.1” must be replaced by “Proposition 5.2”.
16. Pages 204 and 205. Throughout Section 6.1, we assume also that  $F(\mathbf{0})$  is a diagonal matrix (without loss of generality but possibly by an appropriate state transformation). This assumption should be added after line 8 of page 204.
17. Page 210, equation (6.27): “ $|\mathbf{Z}||\mathbf{Z}_t|^2$ ” should be replaced by “ $|\mathbf{Z}|^2|\mathbf{Z}_t|$ ” in the last term.
18. Pages 211, 212, 213, 214. Throughout the proof of Theorem 6.6, the word “diag” must be deleted (eleven times). Moreover, the notation

$$\left[ \frac{\partial A}{\partial \mathbf{Z}}(\mathbf{Z}, x)\mathbf{Z}_t \right]$$

stands for the matrix where the  $i, j$  entry is  $(\partial A_{ij}(\mathbf{Z}, x)/\partial \mathbf{Z})\mathbf{Z}_t$ . The statement in lines 6, 7, 8 of page 211 should be modified accordingly.

19. Page 215, line -4. “exits” should be replaced by “exists”.
20. Page 215, inequation (6.48). An exponent “1/2” is missing in the right-hand side. The correct inequation (6.48) is:

$$|\varphi|_0 \leq C_1 \left( \int_0^L (|\varphi(x)|^2 + |\varphi'(x)|^2) dx \right)^{\frac{1}{2}}. \quad (1)$$

21. Page 216, line -10. A parenthesis is missing. The correct inequation is:

$$\frac{d\mathbf{V}}{dt} = (-2\gamma + C_3(|\mathbf{Z}(t, \cdot)|_0 + |\mathbf{Z}_t(t, \cdot)|_0))\mathbf{V} \leq -\alpha\mathbf{V}.$$

22. Page 218, line 5. Replace  $Q'(x)\Lambda$  by  $(Q(x)\Lambda(x))_x$  in this formula.
23. Page 218, line -4. “Perollaz” should be replaced by “Perrollaz”.

24. Page 221, line 7: replace “ $\mathbf{S}_x$ ” by “ $\mathbf{S}_\xi$ ”.
25. Page 224, line 4. “ $S_1(t, L)$ ” should be replaced by “ $S_1^\#(t, L)$ ”, such that the boundary condition is

$$S_1^\#(t, 0) = 0, \quad S_2^\#(t, L) = \gamma S_1^\#(t, L).$$

26. Page 224, line -6: replace “ $P_\xi$ ” by “ $\tilde{P}_\xi$ ”
27. Page 224, last line. The “tilde” upperscript is missing. The correct coefficients are “ $\tilde{p}_{01}$ ” and “ $\tilde{p}_{10}$ ” respectively.
28. Page 230, line - 10. In the formula of  $S_f$ , the term  $A^{5/3}$  should be at the denominator. The corrected formula is:

$$S_f \triangleq \left( \frac{Q(P(A))^{2/3}}{\nu A^{5/3}} \right)^2.$$

29. Page 263. At the end of the first line of the proof of Proposition C.2., “ $\rho(k) = |k|$ ” should be replaced by “ $\rho_2(k) = |k|$ ”.
30. Page 267, line - 8. Replace “ $K$ ” by “ $\mathbf{K}$ ”.
31. Page 280. In equation (C.98), delete “*notag*”.
32. Page 302, lines 9 and 11. “Perollaz” should be replaced by “Perrollaz”.