Addendum-Erratum to *Dissipative Systems Analysis and Control*, 2nd Edition, 2007

(the first figure indicates the page number)

- Notation section: $\lambda(A)$: an eigenvalue of $A \in \mathbb{R}^{n\times n}$.
- Notation section: $\sigma(A)$: the set of eigenvalues of $A \in \mathbb{R}^{n\times n}$ (*i.e.* the spectrum of A).
- 17, 18, 28: line 2 after (2.22), and also in (2.24), (2.29), (2.30), line 3 in the equation above (2.75): change $u_T(t)$ to $u_t(\tau)$, and $u_T(j\omega)$ to $u_t(j\omega)$.
- 17: line 8, the integration is done over $\tau \in [0,t]$
- 32: obviously the expression for $P(\omega_e)$ under (2.95) is meaningless. Please contact Prof. O. Egeland for details.
- 59, lemma 2.55: rational
- 81, Lemma 3.11: $\mu_{\min}(A)$ denotes the minimum eigenvalue of the symmetrized matrix $\frac{1}{2}(A + A^T)$.
- 81: $\sigma_{\min}(B) > 0$ is equivalent to $\mathrm{Ker}(B) = \{0\}$, and to $m < n$ and B of full rank m.
- 81, last line: it is $H(j\omega - \mu)$, not $T(j\omega - \mu)$
- 89 line 6: it is $H(j\omega)$, not $T(j\omega)$
- 88, line -3: it is $H(j\omega)$, not $T(j\omega)$
- 101: in the framed set of implications/equivalences, the last implication has to be reversed and in the last line this is $P = P^T \geq 0$ (hence the last condition is really sufficient for PRness as indicated in the paragraph in between the two framed sets.
- 119: in (3.134) it is $\frac{\partial V_f}{\partial x}(x)[Ax + Bu] + w(x,u) \geq 0$
- 121, line 5 after remark 3.38: Thus $H(-j\omega, j\omega)$ is the condition....
- 123, left hand side of (3.148): P is G
- 124, line 2: P is G
- 125: line 5 after Theorem 3.44: numerically

- Section 3.9 (Lur'e problem and absolute stability): it's also worth reading the survey by R. Shorten et al, "Stability Criteria for Switched and Hybrid Systems", SIAM review, vol.49, no 4, pp.545-592, 2007, and in particular section 6 therein. Their Theorem 6.2 is close to Theorem 2.49 page 57 in the book.

- 147, example 3.75: it is $Ax = 0$ if $x < 0$. The notation x^+ means $\max(0, x)$.

- 149, the dissipativity of linear complementarity systems is throughly investigated in Camlibel, Iannelli, Vasca, "Passivity and complementarity", Mathematical Programming A, 2013, DOI: 10.1007/s10107-013-0678-4 . Closely related results concerning Lur'e set-valued systems are in Brogliato and Goeleven, "Existence, uniqueness of solutions and stability of nonsmooth multivalued Lur'e dynamical systems", Journal of Convex Analysis, vol.20, no 3, 2013, and "Well-posedness, stability and invariance results for a class of multivalued Lur'e dynamical systems", Nonlinear Analysis: Theory, Methods and Applications, vol.74, pp.195-212, 2011.

- 167, in Remark 3.96 this is $[0, \infty)$ (see Theorem 3.91)

- 175, preservation of dissipativity after time-discretization has recently been tackled in S. Greenhalg, V. Acary, B. Brogliato, "Preservation of the dissipativity properties of a class of nonsmooth dynamical systems with the (θ, γ)-algorithm", Numerische Mathematik, 125(4), 2013. See several references that concern this issue in this article. The issue that is tackled concerns the preservation of the strorage function, the supply rate, and the dissipation function, and therefore yields much more stringent conditions than the mere preservation of dissipativity (with possible different supply rate, dissipation function after discretization).

- 170, about the Popov's line. In the book by Aiserman and Gantmacher from 1965 it is pointed outy that Popov criterion also holds in the case of a negative slope $\frac{1}{r}$.

- 183, Fact 8: the inequality is strict in $(1 \leq p < +\infty)$, because obviously this does not work for the infinity norm (take $f(\cdot)$ as a constant non zero function).

- 183: Fact 7: in the proof, we compute the smallest lower-bound.

- 192, in (4.18) all T are t

- 197: second line of definition 4.26: $u(t) \in \mathcal{U}$.

- 197-198: the role of the additive constants β which basically accounts for initial stored energy, has also been investigated in D.H. Hill: 'Dissipative nonlinear systems: basic properties and stability analysis", Proc. of IEEE CDC, pp.3259-3264, 16-18 December 1992.

- 204, Theorem 4.43: It is supposed that there exists a storage function $V(\cdot)$ such that $V(x^\star) = 0$, so that $V_r(x^\star) = 0$. From the definition of the required supply in Definition 4.36, this also assumes that the system is reachable from $x^\star$. This is Theorem 2 in [510].

- 202: more on reversibility and its relationship with reciprocity, for LTI systems, is in [511,sections 8 and 9]. In particular Theorem 8 of [51] provides a way to check reversibility.

- 230 and 116: Lemma 3.36 page 116, and Lemma 4.91 page 230, are taken from the book referenced 145 by Faurre, Clerget and Germain. In fact Lemma 3.36 is presented in the book by Faurre et al as a corollary of Lemma 4.91.

- 230, Lemma 4.91: in (4.94) this is $V(t,x)$.

- p.247, line 10: alll should be all.

- 248 and 249, replace all (4.108) by (4.163)

- 251, Theorem 4.111, line 2: $I\!R^{m\times m}$

- Section 5.1: Most of the results presented in this section have been stated in two articles by D.J. Hill and P. Moylan: "Stability results for nonlinear feedback systems", Automatica, vol.13, pp.377-382, 1977, and "General instability results for interconnected systems", SIAM J. Control and Optimization, vol.21, no 2, pp.256-279, 1983. The errata for these papers include the following. In the SIAM paper, the first condition that appears in equation (12), Theorem 7, is redundant. In the Automatica article, condition (iii) of Theorem 4 can be removed, while condition (ii) should be stated with $T\bar{A}(\cdot)$ a nonnegative real valued function.

- 254, 255: in (4.185) replace $\frac{\partial u}{\partial x}$ in the first term of the left-hand side by $\frac{\partial u}{\partial t}$. Line after lemma 4.115: do the same for the equality after "One has", and delete the "is". Also the power 2 is missing in the integrand. In (4.188) multiply the first term in the left-hand side by $\frac{1}{2}$. These two Lemmas are taken from H. Brézis, Analyse Fonctionnelle, Théorie et Applications, Masson, Paris, 1983, sections X.1 and X.3.

- 267: from Lemma 5.13 and Corollary 3.4 it may be deduced that the solutions $P = P^T$ of the KYP Lemma LMI, are > 0 if (C, A) is observable.

- 298: in Theorem 5.68, this is "...with input $u(\cdot)$..."

- 305: line before section 5.9.4: Bounded

- 306: Theorem 5.71 is taken from M.R. James et al, SIAM J. Control Optimization, vol.43, no 5, pp.1535-1582, 2005.

- 339: In definition 6.37: a symmetric positive definite matrix $R(x)$; in equation (6.95), this is $(J(x) - R(x))\frac{\partial H_0}{\partial x} + ...$

- 366: generally speaking BV functions do not satisfy that for any t, there exists a σ such the function is continuous on $[t, t+\sigma)$. This is because at t a BV function may possess an accumulation of jumps on the left, and an accumulation of jumps on the right. But in mechanical systems with frictionless unilateral constraints and piecewise analytic data, accumulations of impacts on the right do not exist (result of Ballard in 2000). So in this particular case the generalized velocity has this property.
- 368: line -8, it is $-\partial\psi_V(x)$.
- 382: ξ in the line after (7.10) refers to the ξ in (6.184)
- section 3.9.4: Notice that for a maximal monotone operator $F : \mathbb{R}^n \to \mathbb{R}^n$, $x \mapsto y = F(x)$, with $F = \partial f$ where $f(\cdot)$ is convex, proper, lower semi continuous, then the "input-output" product satisfies $x^T y = f(x) + f^*(y)$, where $f^*(\cdot)$ is the dual function of $f(\cdot)$.
- 409: CTCE means Cross Terms Cancellation Equality
- 431 line 2 section 7.8.3: (6.162) is (6.156), and λ_{z_1} is as in (6.169)
- 133, line -2 before (3.176): P_e
- 426, line 6: actuator dynamics
- 431, line 1, (7.169): λ_{z_d} is λ_d
- 533, Lemma A.65: the last condition is $S(I - R^\dagger R) = 0$ or equivalently $(I - RR^\dagger)S^T = 0$.
- 536, line 11 in the proof of Lemma A.71: realization
- 564, reference [470]: 1992