Corrigenda to "'Multiple Time Scale Dynamics"

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Abstract

This document is going to collect corrigenda to the book [4]. In particular, typographical and similar errors will be marked in blue while (hopefully not many) mathematical errors will be labeled red. Unfortunately, the existence problem for errors is not very pleasant, e.g., suppose each page is correct with 99% probability and we take a rough page count at 800 pages total then $\mathbb{P}(\text{"no errors at all"}) = (0.99)^{800} \approx 3 \cdot 10^{-4}$ or otherwise said: the probability of no errors in the entire book would be approximately 0.03%. Hence, the existence of this document is unfortunately necessary. Please send me any errors or typos you find and I am going to include them here; please make sure you know precisely how a *correct* version should read to avoid false alarms.

- p.45-46,Thm. 2.3.12: The statement (g) in the theorem is apparently not correct as stated since the foliation $\mathcal{F}^u(p)$ (and similar $\mathcal{F}^s(p)$) is only $C^{1,\alpha}$, for under the current assumptions; cf. also the (apparently equally imprecise) statement in [5] to the original hypotheses in [1, 2]. This smoothness issue does not occur for fast-slow systems, so the results in later chapters still hold.
- p.168,l-4:: Replace "are directions" by "are two coordinate directions"
- p.179,(R3): Important typo: replace $c_2 \ln \varepsilon$ by $c_2 \varepsilon \ln \varepsilon$
- p.229,(8.67): The first equality should be an inequality $\frac{\partial^2 f}{\partial x^2}(0,0,0) \neq 0$. Furthermore, in the matrix inside the determinant the lower right entry is a double derivative with respect to y, not x.
- p.362-363: The implicit assumption "$g(0,0,y,0) > 0$ for all $y \in \mathbb{R}$" (or in a suitable compact set on which the slow flow is considered) should have been stated explicitly. Add this as assumption (A5) on p.362 and then replace (A1)-(A4) by (A1)-(A5) in Theorem 12.2.3 on p.363.
- p.364,l.-3: Replace "$\gamma(\tau_a)$ is $\mathcal{O}(1)$" by "$\gamma(\tau_b)$ is $\mathcal{O}(1)$".
- p.366,l.2: Replace "solutions remains" by "solution generically remains"; generic breaking of the slow manifold is again required, similar to the discussion in the remark on p.363, to actually get departure at the buffer point.
- p.757: The reference [Kue10a] in the book has the title ("Characterizing slow exit points") of an earlier arXiv version of the paper. It should be correctly cited as appearing in the reference [3] below.
- p.807: The two entries for "Liénard transformation" should be grouped into one entry reading "Liénard transformation, 9, 573".

References

[1] N. Fenichel. Asymptotic stability with rate conditions. *Indiana U. Math. J.*, 23:1109–1137, 1974.

[2] N. Fenichel. Asymptotic stability with rate conditions II. *Indiana U. Math. J.*, 26:81–93, 1977.

[3] C. Kuehn. Connecting fast-slow systems and Conley index theory via transversality. *Electron. J. Differential Equations*, 2010(106):1–20, 2010.

[4] C. Kuehn. *Multiple Time Scale Dynamics.* Springer, 2015. 814 pp.

[5] S. Wiggins. *Normally Hyperbolic Invariant Manifolds in Dynamical Systems.* Springer, 1994.