

# 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.