Erratum

Erratum to: Stability and Asymptotic Behavior of Periodic Traveling Wave Solutions of Viscous Conservation Laws in Several Dimensions

MYUNGHYUN OH^{*} & KEVIN ZUMBRUN^{*}

**Erratum to: Arch. Rational Mech. Anal.
DOI 10.1007/s00205-009-0229-6**

The purpose of this note is to correct a repeated typographical error in [6] that significantly affects the meaning/correctness of the paper. Namely, (1) the hypothesis (D3) cited in Propositions 6.3 and 8.1 and Theorems 7.1 and 8.1 is not defined, and (2) hypothesis (D3) is needed but not cited in Propositions 6.2 and 6.4, Corollaries 6.1 and 6.2, and Theorem 6.1.

Corrections

1. With conditions (D1)–(D2) just below Eq. (5.2) should appear also the condition (D3), as follows:

“(D1) $\sigma(L) \subset \{\operatorname{Re} \lambda < 0\} \cup \{0\}$.

(D2) $\operatorname{Re} \sigma(L_\xi) \leq -\theta |\xi|^2$, $\theta > 0$, for $\xi \in \mathbb{R}^d$ and $|\xi|$ sufficiently small.

(D3) The eigenvalue $\lambda = 0$ of L_0 is semi-simple”.

2. Below (D1)–(D3), the passage following the displayed hypothesis (H3) should read:

“Conditions (D1)–(D3) are exactly the spectral assumptions of [4, 7–9], corresponding to “dissipativity” of the large-time behavior of the linearized system. As noted in [4], condition (D3) is in the conservation law setting nongeneric, corresponding to the special “quasi-Hamiltonian” situation studied there; in particular, it implies that speed is to first order constant among the family of spatially

The online version of the original article can be found under doi: [10.1007/s00205-009-0229-6](https://doi.org/10.1007/s00205-009-0229-6).

^{*} Research of M. OH was partially supported under NSF grant No. DMS-0204072 and K. ZUMBRUN was partially supported under NSF grants no. DMS-0300487 and DMS-0801745.

periodic traveling-wave solutions nearby $\bar{u}$. Condition (H3) corresponds to strict hyperbolicity of the averaged system (4.1); presumably it could be removed with further effort/alternative hypotheses.”

Here, we have changed (D1)–(D2) to (D1)–(D3) and added a brief comment on nongenericity.

3. In the statements of Propositions 6.2 and 6.4, Corollaries 6.1 and 6.2, and Theorem 6.1, hypotheses “(D1)–(D2)” should read instead “(D1)–(D3)”.

Discussion

As discussed in [4], the assumption (D3) of semisimplicity of the eigenvalue $\lambda = 0$ at $\xi = 0$ is needed even in the one-dimensional case to ensure smoothness at $\xi = 0$ (stated in Proposition 6.2) of the left and right eigenbases $\tilde{q}_j(\xi)$, $q_j(\xi)$ associated with the eigenvalues $\lambda_j(\xi)$ bifurcating from $\lambda(0) = 0$, since existence of a Jordan block at $\xi = 0$ implies blowup as $\xi \rightarrow 0$ of at least one of the associated eigenprojection $q_j \tilde{q}_j^*$ [3]. Indeed, failure of (D3) implies blowup of $|\tilde{q}(\xi)|$ of order $|\xi|^{-1}$, and thus, through the estimates depending on this bound, degraded linearized estimates with decay rate slower by factor $t^{1/2}$; see [4].

The reader may check that the arguments for nonlinear decay and asymptotic behavior presented in [6] do not close with linearized decay at this slower rate, and so (D3) is indeed needed for the arguments of this paper. For treatments of the general case and of the critical dimensions one and two, see [1, 2].

References

1. JOHNSON, M., ZUMBRUN, K.: Nonlinear stability of periodic traveling wave solutions of systems of viscous conservation laws in the generic case. Preprint (2010)
2. JOHNSON, M., ZUMBRUN, K.: Nonlinear stability of periodic traveling wave solutions of viscous conservation laws in dimensions one and two. Preprint (2009)
3. KATO, T.: Perturbation Theory for Linear Operators. Springer, Berlin, 1985
4. OH, M., ZUMBRUN, K.: Stability of periodic solutions of viscous conservation laws with viscosity—pointwise bounds on the Green function. *Arch. Rational Mech. Anal.* **166**(2), 167–196 (2003)
5. OH, M., ZUMBRUN, K.: Low-frequency stability analysis of periodic traveling-wave solutions of viscous conservation laws in several dimensions. *J. Anal. Appl.* **25**, 1–21 (2006)
6. OH, M., ZUMBRUN, K.: Stability and asymptotic behavior of periodic traveling wave solutions of viscous conservation laws in several dimensions. *Arch. Rational Mech. Anal.* (to appear)
7. SCHNEIDER, G.: Nonlinear diffusive stability of spatially periodic solutions—abstract theorem and higher space dimensions. *Proceedings of the International Conference on Asymptotics in Nonlinear Diffusive Systems (Sendai, 1997)*. Tohoku Math. Publ., 8, Tohoku Univ., Sendai, 159–167, 1998
8. SCHNEIDER, G.: Diffusive stability of spatial periodic solutions of the Swift-Hohenberg equation (English. English summary). *Comm. Math. Phys.* **178**(3), 679–702 (1996)
9. SCHNEIDER, G.: Nonlinear stability of Taylor vortices in infinite cylinders. *Arch. Rational Mech. Anal.* **144**(2), 121–200 (1998)

Department of Mathematics,
University of Kansas,
Kansas, USA.
e-mail: moh@math.ku.edu

and

Department of Mathematics,
Indiana University,
Bloomington, IN 47405, USA.
e-mail: kzumbrun@indiana.edu

Published online January 26, 2010 – © Springer-Verlag (2010)