Erratum to: The Minimal Speed of Traveling Fronts for the Lotka–Volterra Competition System

Jong-Shenq Guo · Xing Liang

Received: 23 October 2013 / Published online: 12 November 2013
© Springer Science+Business Media New York 2013

Erratum to: J Dyn Diff Equat (2011) 23:353–363
DOI 10.1007/s10884-011-9214-5

We study in [1] the minimal speed of traveling front for the following Lotka–Volterra competition system:

$$u_t = u_{xx} + u(1 - u - kv), \quad x, t \in \mathbb{R}, \quad (0.1)$$

$$v_t = dv_{xx} + rv(1 - v - hu), \quad x, t \in \mathbb{R}, \quad (0.2)$$

where $d > 0, r > 0, 0 < k < 1 < h$. The main purpose is to derive some conditions on the parameters h, k, r, d for which the so-called *linear determinacy* ([3]) holds for the system (0.1)–(0.2). For this, we first study the following sequence of discretized problems:

$$(u_j^\tau)'(t) = \mathcal{D}_2[u_j^\tau](t)/\tau^2 + u_j^\tau(t) \left[1 - u_j^\tau(t) - kv_j^\tau(t) \right], \quad j \in \mathbb{Z}, \quad t \in \mathbb{R}, \quad (0.3)$$

$$(v_j^\tau)'(t) = d\mathcal{D}_2[v_j^\tau](t)/\tau^2 + rv_j^\tau(t) \left[1 - v_j^\tau(t) - hu_j^\tau(t) \right], \quad j \in \mathbb{Z}, \quad t \in \mathbb{R}, \quad (0.4)$$

for $\tau > 0$, where $\mathcal{D}_2[w_j] := (w_{j+1} - w_j) + (w_{j-1} - w_j)$. Then, by passing the limit for $\tau \rightarrow 0^+$, we derive the linear determinacy for the continuous system (0.1)–(0.2). A careful check of the proof of [1, Theorem 1], we have the linear determinacy for the discrete problem (0.3)–(0.4) if $(h, k, r, d) \in B_1 \cup B_2$, where

The online version of the original article can be found under doi:[10.1007/s10884-011-9214-5](https://doi.org/10.1007/s10884-011-9214-5).

J.-S. Guo

Department of Mathematics, Tamkang University, Tamsui, Taipei 25137, Taiwan
e-mail: jsguo@mail.tku.edu.tw

X. Liang (✉)

Wu Wen-Tsun Key Laboratory of Mathematics and Department of Mathematics,
University of Science and Technology of China, Hefei, People's Republic of China
e-mail: xliang@ustc.edu.cn

$$B_1 := \{d \in (0, d_*], 1 < h \leq 1/k, r > 0\},$$

$$B_2 := \left\{ d \in (0, d_*], h > 1/k, 0 < r \leq \frac{d_* - d}{d_* - 1} \frac{1 - k}{hk - 1} \right\}$$

for some constant $d_* > 2$. However, the constant d_* depends on τ and one can prove that $d_*(\tau) \downarrow 2$ as $\tau \rightarrow 0^+$ ([2]). Therefore, [1, Theorem 2] has to be corrected. In fact, we can only re-produce the result of [3] (except when $r = (2 - d)(1 - k)/(hk - 1)$ for $d \in (0, 1)$). Although our method is very indirect, it can be used in other similar problems (see, e.g., [2]). Moreover, we also obtain the linear determinacy for the corresponding discrete problem.

References

1. Guo, J.-S., Liang, X.: The minimal speed of traveling fronts for the Lotka–Volterra competition system. *J. Dyn. Diff. Equat.* **23**, 353–363 (2011)
2. Guo J.-S., Wang Y., Wu C.-H., Wu C.-C.: The existence of traveling wave solutions for a three species competition system (preprint)
3. Lewis, M.A., Li, B., Weinberger, H.F.: Spreading speed and linear determinacy for two-species competition models. *J. Math. Biol.* **45**, 219–233 (2002)