ERRATA FOR PERRON–FROBENIUS THEOREM FOR NONNEGATIVE TENSORS

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K.C. CHANG*, KELLY PEARSON†, AND TAN ZHANG‡

On line 16 from the bottom on page 518 of Comm. Math. Sci. Vol. 6, No. 2 (2008), we conclude that $\tilde{C}_k$ satisfies (1) and (2) in the definition of Condition (E). This is a mistake; $\tilde{C}_k$ does not satisfy (2). Accordingly, the last sentence of Theorem 5.9 and the Z-eigenvalue part in Corollary 5.10 do not hold.

In fact, to an irreducible nonnegative tensor $\mathcal{A}$ we can only conclude that there exists a positive Z-eigenvalue with a Z-eigenvector $x_0 \in intP$. Unlike the H-eigenvalue problem, there is no uniqueness for the positive Z-eigenvalue with positive eigenvector. The following is an example.

We define a 4-order 2-dimensional nonnegative irreducible tensor $\mathcal{A} = (a_{i_1 i_2 i_3 i_4})$, where

$$a_{i_1 i_2 i_3 i_4} = \begin{cases} \frac{4}{\sqrt{3}}, & \text{if } (i_1 i_2 i_3 i_4) = (1111), (2222), \\ 1, & \text{if } (i_1 i_2 i_3 i_4) = (1222), (2111), \\ 0, & \text{elsewhere.} \end{cases}$$

Then (u, λ), where $u = (x, y)$, is a Z-eigenvector/eigenvalue of $\mathcal{A}$ if it satisfies the system

$$\begin{cases} \frac{4}{\sqrt{3}} x^3 + y^3 = \lambda x (x^2 + y^2), \\ x^3 + \frac{4}{\sqrt{3}} y^3 = \lambda y (x^2 + y^2). \end{cases}$$

We have the following solutions on the unit circle: $(x_1, y_1) = (\frac{\sqrt{3}}{2}, \frac{1}{2})$, $\lambda_1 = \frac{13}{4\sqrt{3}}$, $(x_2, y_2) = (\frac{1}{2}, \frac{\sqrt{3}}{2})$, $\lambda_2 = \frac{13}{4\sqrt{3}}$, $(x_3, y_3) = (\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}})$, $\lambda_3 = \frac{4+\sqrt{3}}{2\sqrt{3}}$, $(x_4, y_4) = (\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}})$, $\lambda_4 = \frac{4-\sqrt{3}}{2\sqrt{3}}$.

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*LMAM, School of Math. Sci., Peking Univ., Beijing 100871, China (kcchang@math.pku.edu.cn).

†Department of Mathematics & Statistics., Murray State Univ., Murray, KY 42071, USA (kelly.pearson@murraystate.edu).

‡Department of Mathematics & Statistics., Murray State Univ., Murray, KY 42071, USA (tan.zhang@murraystate.edu).