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Huijberts, H. J. C.; Nijmeijer, H.; Oguchi, T.

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Erratum: “Anticipating synchronization of chaotic Lur’e systems” [Chaos 17, 013117 (2007)]

Henri Huijbers,1 Henk Nijmeijer,2 and Toshiki Oguchi3
1School of Engineering and Materials Science, Queen Mary, University of London, Mile End Road, London E1 4NS, United Kingdom
2Department of Mechanical Engineering, Eindhoven University of Technology, P. O. Box 513, 5600 MB Eindhoven, The Netherlands
3Department of Mechanical Engineering, Tokyo Metropolitan University, 1-1 Minami-Osawa, Hachiioji-shi, Tokyo 192-0397, Japan

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I. INTRODUCTION

It has been brought to our attention that there is a small yet annoying error in our manuscript “Anticipating synchronization of chaotic Lur’e systems.” It is the purpose of this note to provide a complete correction.

II. ERRATA

In the integral in the expression of \( \dot{V}_2(e) \) in Eq. (B5), the following terms are missing: \( 2 \tau \psi(x(t), e(t))B^TZA_0e(t) \) and \( 2 \tau \psi(x(t), e(t))B^TZA_1e(t-\tau) \). As a consequence, the matrix \( A_1 \) at the bottom of page 11 should become

\[
A_1 = \begin{pmatrix}
A_TZ_0 & A_TZ_1 & A_TZ_2 - Y \\
A_TZ_0 & A_TZ_1 & A_TZ_2 - W \\
B^TZA_0 & B^TZA_1 & B^TZA_2 - W
\end{pmatrix},
\]

and the linear matrix inequality (LMI) [Eq. (B2)] can be simplified to

\[
\begin{pmatrix}
PA_0 + A^TP + Y + Y^T + Q & PA_1 - Y + W^T & PB + \gamma \lambda C^T - \tau Y & \bar{\tau}A_TZ \\
A^TP - Y^T + W & -Q - W - W^T & 0 - \tau W & \bar{\tau}W^T \\
B^TP + \gamma \lambda C & 0 - 2\lambda & 0 - \tau Z & 0 \\
-\bar{\tau}Y & -\bar{\tau}W^T & 0 - \bar{\tau}Z & 0 \\
\bar{\tau}Z & \bar{\tau}A_1 & \bar{\tau}Z & 0 - \bar{\tau}Z
\end{pmatrix} < 0.
\]

The formulation of Theorem 3 then becomes as follows.

**Theorem 3:** Let \( \bar{\tau} > 0 \) be given. Assume that there exist scalars \( \alpha, \lambda > 0 \) and matrices \( P > 0, Q > 0, X, Y, \) and \( W \) such that the following LMI holds:

\[
\begin{pmatrix}
PA + A^TP + Y + Y^T + Q & X - Y + W^T & PB + \gamma \lambda C^T - \tau Y & \alpha \bar{\tau}A_T^TP \\
X^T - Y^T + W & -Q - W - W^T & 0 - \tau W & \alpha \bar{\tau}X^T \\
B^TP + \gamma \lambda C & 0 - 2\lambda & 0 - \alpha \bar{\tau}P & 0 \\
-\bar{\tau}Y & -\bar{\tau}W^T & 0 - \alpha \bar{\tau}P & 0 \\
\alpha \bar{\tau}PA & \alpha \bar{\tau}X & \alpha \bar{\tau}PB & 0 - \alpha \bar{\tau}P
\end{pmatrix} < 0.
\]

Define the matrices

\[
N := \begin{pmatrix}
-\bar{\tau} & \alpha \bar{\tau}A^T \\
-\bar{\tau} & \alpha \bar{\tau}X \\
0 & \alpha \bar{\tau}B^T
\end{pmatrix}, \quad \Pi := -\alpha \text{ diag}(P, P),
\]

\[
\Gamma := \begin{pmatrix}
PA + A^TP + Y + Y^T + Q & X - Y + W^T & PB + \gamma \lambda C^T \\
X^T - Y^T + W & -Q - W - W^T & 0 \\
B^TP + \gamma \lambda C & 0 - 2\lambda
\end{pmatrix}, \quad \Delta := \Pi N^{-1} \Gamma^T,
\]

and let \( \bar{\tau}^* \) be the minimum eigenvalue of the matrix pencil \((\Gamma, -\Delta)\). Then \( \bar{\tau} > \bar{\tau} \) and for \( \mathcal{M} = P^{-1}X \) the dynamics (19) are asymptotically stable for every \( 0 < \tau < \bar{\tau}^* \).
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\textsuperscript{1}H. Huijberts, H. Nijmeijer, and T. Oguchi, Chaos \textbf{17}, 013117 (2007).
\textsuperscript{2}P. J. Neefs (private communication).