KYBERNETIKA — VOLUME 44 (2008), NUMBER 4, PAGES 571-584

Global Synchronization of Chaotic Lur'e Systems via Replacing Variables Control

Xiao-Feng Wu; Yi Zhao; Mu-Hong Wang

Abstract: Finding sufficient criteria for synchronization of master-slave chaotic systems by replacing variables control has been an open problem in the field of chaos control. This paper presents some recent works on the subject, with emphasis on chaos synchronization of both identical and parametrically mismatched Lur'e systems by replacing variables control. The synchronization schemes are formally constructed and two classes of sufficient criteria for global synchronization, linear matrix inequality criterion and frequency-domain criterion, are reviewed and discussed.

Keywords: chaos; synchronization; Lur'e system; replacing variables control;

AMS Subject Classification: 37D45; 74H65; 93D05;

References

[1] M. A. Aizerman and F. R. Gantmacher: Absolute Stability of Regulator Systems. Holder-Day Inc. 1964.

[2] S. Boccaletti, J. Kurths, G. Osipov, D. L. Valladares, and C. S. Zhou: The synchronization of chaotic systems. Phys. Rep. 366 (2002), 1–101.

[3] P. F. Curran and L. O. Chua: Absolute stability theory and the synchronization problem. Internat. J. Bifur. Chaos 7 (1997), 1375–1382.

[4] L. M. Pecora and T. L. Carroll: Synchronization in chaotic systems. Phys. Rev. Lett. 64 (1990), 821–824.

[5] L. M. Pecora and T. L. Carroll: Driving systems with chaotic signals. Phys. Rev. A 44 (1991), 2374–2383.

[6] J. A. K. Suykens, P. F. Curran, and L. O. Chua: Robust synthesis for master-slave synchronization of Lur'e systems. IEEE Trans. Circuits and Systems-I 46 (1999), 841–850.

[7] J. A. K. Suykens, P. F. Curran, T. Yang, J. Vandewalle, and L. O. Chua: Nonlinear synchronization of Lur'e systems: dynamic output feedback case. IEEE Trans. Circuits and Systems-I 44 (1997), 1089–1092.

[8] J. A. K. Suykens, J. Vandewalle, and L. O. Chua: Nonlinear synchronization of chaotic Lur'e system. Internat. J. Bifur. Chaos 7 (1997), 1323–1335.

[9] J. A. K. Suykens and J. Vandewalle: Master-slave synchronization of Lur'e systems. Internat. J. Bifur. Chaos 7 (1997), 665–669.

[10] J. A. K. Suykens, M. E. Yalcin, and J. Vandewalle: Chaotic systems synchronization. In: Chaos and Bifurcation Control: Theory and Application (G. Chen and X. Yu, eds., Lecture Notes in Control and Information Sciences 292). Springer-Verlag, Hong Kong 2004, pp. 117–135.

[11] J. A. K. Suykens, T. Yang, and L. O. Chua: Impulsive synchronization of chaotic Lur's systems by measurement feedback. Internat. J. Bifur. Chaos 8 (1998), 1371–1381.

[12] X. F. Wang, Z. Q. Wang, and G. R. Chen: A new criterion for synchronization of coupled chaotic oscillators with application to Chua's circuits. Internat. J. Bifur. Chaos 9 (1999), 1169–1174.

[13] X. F. Wu and M. H. Wang: Robust synchronization of chaotic Lur'e systems via replacing variables control. Internat. J. Bifur. Chaos 16 (2006), 3421–3434.

[14] X. F. Wu and Y. Zhao: Frequency domain criterion for chaos synchronization of Lur'e systems via state feedback control. Internat. J. Bifur. Chaos 15 (2005), 1145–1154.

[15] X. F. Wu, Y. Zhao, and X. H. Huang: Some new criteria for lag synchronization of chaotic Lur'e systems by replacing variables control. J. Control Theory Appl. 2 (2004), 259–266.

[16] X. F. Wu, Y. Zhao, and S. Zhou: Lag synchronization of chaotic Lur'e systems via replacing variables control. Internat. J. Bifur. Chaos 15 (2005), 617–635.

[17] H. M. Xie: Theory and Application of Absolute stability. Science Press, Beijing 1986.

[18] T. Yang and L. O. Chua: Impulsive stabilization for control and synchronization of chaotic systems: theory and application to secure communication. IEEE Trans. Circuits and Systems-I 44 (1997), 976–988.