

{tag}

{/tag}

International Journal of Computer Applications
© 2015 by IJCA Journal

Volume 119 - Number 16

Year of Publication: 2015

Authors:

Zhenfeng Chen

Xuhong Zhang

Zhongsheng Wang

10.5120/21150-4168

{bibtex}pxc3904168.bib{/bibtex}

Abstract

In this paper, a novel systematic design procedure is presented for a class of uncertain nonlinear systems. Such design procedure can remove the control input terms which contain the unknown nonlinearities as the control coefficients, and provides the following advantages: it not only avoids a possible singularity problem completely, but also simplifies the control design process. Moreover, the proposed design procedure can provide simple control structure under the relaxed conditions, which is easy to implement and can be applied to a wider class of systems.

References

- Chen Z. F. , Ge S. S. , Zhang Y. , Li Y. 2014. Adaptive neural control of MIMO nonlinear systems with a block-triangular pure-feedback control structure. IEEE Transactions on Neural Networks and Learning Systems. 25(11), 2017-2029.
- Chen Z. F. , Zhang Y. 2014. Robust control of a class of nonaffine nonlinear systems

by state and output feedback. *Journal of Central South University*, 21(4), 1322-1328.

- Zhang L. , Li K. , Bai E. W. 2013. A new extension of newton algorithm for nonlinear system modelling using RBF neural networks. *IEEE Trans. Automat. Contr.* 58(11), 2929-2933.
- Chen F. C. , Liu C. C. 1994. Adaptively controlling nonlinear continuous-time systems using multilayer neural networks. *IEEE Trans. Automat. Contr.* 39, 1306-1310.
- Sastry S. S. , Isidori A. 1989. Adaptive control of linearizable systems. *IEEE Trans. Automat. Contr.* 34, 1123-1131.
- Polycarpou M. M. , Ioannou P. A. 1992. Modeling, identification and stable adaptive control of continuous-time nonlinear dynamical system using neural networks. *Proc. Am. Contr. Conf. Chicago, IL*, 36-40.
- Wang L. X. 1994. *Adaptive Fuzzy Systems and Control: Design and Analysis*. Englewood Cliffs, NJ: Prentice-Hall.
- Spooner J. T. , Passino K. M. 1996. Stable adaptive control using fuzzy systems and neural networks. *IEEE Trans. Fuzzy Syst.* 4, 339-359.
- Sanner R. M. , Slotine J. E. 1992. Gaussian networks for direct adaptive control. *IEEE Trans. Neural Networks*, 3, 837-863.
- Ge S. S. , Hang C. C. , Zhang T. 1999. A direct method for robust adaptive nonlinear control with guaranteed transient performance. *Systems & Control Letters.* 37, 275-284.
- Zhang T. , Ge S. S. , Hang C. C. 1999. Design and performance analysis of a direct adaptive controller for nonlinear systems. *Automatica.* 35, 1809-1817.
- Zhang T. , Ge S. S. , Hang C. C. 2000. Stable adaptive control for a class of nonlinear systems using a modified Lyapunov function. *IEEE Trans. Automat. Contr.* 45, 129-132.
- Huang S. N. , Tan K. K. , Lee T. H. 2003. Further results on adaptive control for nonlinear systems using neural networks. *IEEE Trans. Neural Netw.* 14(3), 129-132.
- Huang S. N. , Tan K. K. , Lee T. H. 2004. An improvement on stable adaptive control for a class of nonlinear systems. *IEEE Trans. Automat. Contr.* 49(8), 1398-1403.
- Krstić M. , Kanellakopoulos I. , Kokotović P. V. 1995. *Nonlinear and Adaptive Control Design*. New York: Wiley.
- Sepulchre R. , Janković M. , Kokotović P. V. 1997. *Constructive nonlinear control*. London, U. K. :Springer-Verlag.
- Ge S. S. , Hang C. C. , Lee T. H. , Zhang T. 2001. *Stable Adaptive Neural Network Control*. Norwell, MA: Kluwer.
- Young W. H. 1912. On the multiplication of successions of Fourier constants. *Proc. Roy. Soc. Lond. Series A*, 87(596), 331-339.
- Qu Z. 1998. *Robust Control of Nonlinear Uncertain Systems*. New York: Wiley.
- Slotine J. E. , Li W. 1991. *Applied Nonlinear Control*. Englewood Cliffs, NJ: Prentice-Hall.
- Polycarpou M. M. , Ioannou P. A. 1995. A robust adaptive nonlinear control design. *Automatica.* 32(3), 423-427.
- Vidyasagar M. 1993. *Nonlinear Systems Analysis*, 2nd ed. Englewood Cliffs, NJ: Prentice-Hall.

Index Terms

Computer Science

Applied Mathematics

Keywords

Adaptive control Lyapunov function stability