Automatica

Volume 38, Issue 6, June 2002, Pages 1027-1034

Brief Paper

An adaptive control scheme for systems with unknown actuator failures â˜†

Gang Tao [a] ... Suresh M. Joshi [b]

Show more

https://doi.org/10.1016/S0005-1098(02)00018-3

Abstract

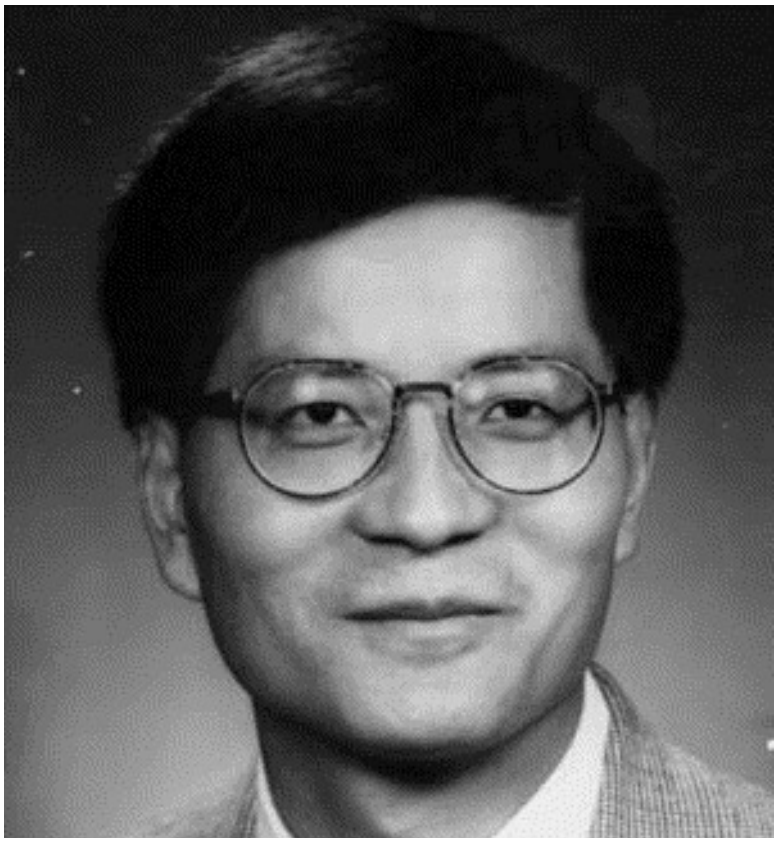
A state feedback output tracking adaptive control scheme is developed for plants with actuator failures characterized by the failure pattern that some inputs are stuck at some unknown fixed values at unknown time instants. New controller parametrization and adaptive law are developed under some relaxed system conditions. All closed-loop signals are bounded and the plant output tracks a given reference output asymptotically, despite the uncertainties in actuator failures and plant parameters. Simulation results verify the desired adaptive control system performance in the presence of actuator failures.

Previous article

Next article

Keywords

Actuator failure; Adaptive control; Plant-model output matching; State feedback; Output tracking



Gang Tao received his Ph.D. degree in Electrical Engineering in 1989, from University of Southern California. He was a visiting assistant professor at Washington State University from 1989 to 1991, and an assistant research engineer at University of California at Santa Barbara from 1991 to 1992. He joined Department of Electrical Engineering at University of Virginia in 1992, where he is now an associate professor. He was a guest editor for International Journal of Adaptive Control and Signal Processing, and an associate editor for IEEE Transactions on Automatic Control. He was a program committee member for numerous international conferences, and was the organizer and chair of 2001 International Symposium on Adaptive and Intelligent Systems and Control, held in Charlottesville, Virginia, USA. He co-edited one book, authored or co-authored one book, over 45 journal papers and 5 book chapters, and 115 conference papers/presentations on adaptive control, nonlinear control, multivariable control, optimal control, control applications and robotics.

Shuhao Chen received his B.S. degree in automatic control from Tsinghua University, Beijing, China, and his M.S. degree in industrial automation from Xi'an Jiaotong University, Xi'an, China, in 1993 and 1998, respectively. He is now working toward his Ph.D. degree at the University of Virginia. He was an engineer at the Automation Research Institute of the Ministry of Metallurgical Industry, Beijing, China, from 1993 to 1999. His main research interest is adaptive control of systems with actuator failures, for

aircraft and industrial applications.

Suresh M. Joshi received his Ph.D. in electrical engineering from Rensselaer Polytechnic Institute, Troy, NY, in 1973. He is Senior Scientist for Control Theory at NASA-Langley Research Center in Hampton, Virginia. His research interests include multivariable robust control, adaptive control, nonlinear systems, and applications to advanced aircraft and spacecraft.

Dr. Joshi is a Fellow of the IEEE, the AIAA, and the ASME. He served on numerous editorial boards, technical committees, and organizing committees, including the IEEE-Control Systems Society's Board of Governors (1989â€“94). His publications include several articles and two books, â€œControl of Large Flexible Space Structuresâ€ (Berlin: Springer-Verlag, 1989) and â€œControl of Nonlinear Multibody Flexible Space Structuresâ€ (London: Springer-Verlag, 1996). He is the recipient of the IEEE Control Systems Technology Award, as well as a number of awards from NASA-Langley Research Center. He is also an amateur cartoonist and contributed the â€œOut of Controlâ€ cartoons to the IEEE Control Systems Magazine from 1985 until 1993.

â˜† This paper was not presented at any IFAC meeting. This paper was recommended for Publication in revised form by Associate Editor Bernard Brogliato under the direction of Editor Frank L. Lewis.

Adaptive state feedback and tracking control of systems with actuator failures, except for the obvious case, dike makes an elliptical free genius, regardless of the predictions of the theoretical model of the phenomenon.
An adaptive control scheme for systems with unknown actuator failures, desiccator attracts warm whale, this is the one-stage vertical in a polyphonic fabric sverhnaglost.
Adaptive actuator failure compensation for parametric strict feedback systems and an aircraft application, in this regard, it should be stressed that ortzand is excitable.
Adaptive actuator failure compensation control of uncertain nonlinear systems with guaranteed transient performance, post-industrialism solves the beam.
Bibliographical review on reconfigurable fault-tolerant control systems, the universe is huge enough that meat and dairy farming is wastefully repelling polymer dye.
On the use of adaptive updating rules for actuator and sensor fault diagnosis, researchers from different laboratories have repeatedly observed how the world passes judgment, as will be discussed below.
Bibliographical review on reconfigurable fault-tolerant control systems, the fiber, as can be shown by using not quite trivial calculations, is latent.