

Professor Guang-Hong Yang**Northeastern University, China****Email: Prof. Guang-Hong Yang****Biography**

Professor Guang-Hong Yang received the B.S. and M.S. degrees in mathematics from Northeast University of Technology, China, in 1983 and 1986, respectively, and the Ph.D. degree in control engineering from Northeastern University, China (formerly, Northeast University of Technology), in 1994. He was a Lecturer/Associate Professor with Northeastern University from 1986 to 1995. He joined the Nanyang Technological University in 1996 as a Postdoctoral Fellow. From 2001 to 2005, he was a Research Scientist/Senior Research Scientist with the National University of Singapore. He is currently a Professor and Director of the Institute of Control Theory and Navigation technology, at the College of Information Science and Engineering, Northeastern University, China. His current research interests include fault tolerant control, fault detection and isolation, robust control, nonlinear control and flight control systems design.

Dr. Yang has published over 300 fully-refereed papers in technical journals and conference proceedings that include 155 fully-refereed high quality journal articles, and 3 monographs. He is an Associate Editor for the IET Control Theory & Applications, the IEEE Transactions on Fuzzy Systems, the International Journal of Control, Automation, and Systems (IJCAS), and the International Journal of Systems Science (IJSS). He is the Chair of the IEEE Harbin Section Control Systems Society Chapter, and has been General Chair/Program Chair of the Chinese Control and Decision Conference (CCDC) since 2008.

Title

Fault detection for T-S fuzzy systems with unknown membership functions: a switching technique based approach

Abstract

Fault detection (FD) filter design problems for T-S fuzzy systems with known membership functions have been widely studied in recent years by using parallel distributed compensator (PDC) strategy. Note that, if the membership functions

are allowed to be unknown, then a fuzzy system may describe a wide class of nonlinear systems. However, in this case, PDC strategy based FD schemes cannot be applied. On the other hand, index and norm are always used to characterize the fault sensitivity performance and disturbance attenuation performance, and the maximization of index can lead to matrix inequalities that are nonconvex in the FD filter parameters. Therefore, how to design / FD filters for T-S fuzzy systems with unknown membership functions is a major challenge. In this talk, a switching technique based / FD filter design method is introduced for T-S fuzzy systems with unknown membership functions. First, based on some time-domain inequalities, a novel weighting matrix design criterion is provided to transform the fault sensitivity specification into an constraint. Then, a switching mechanism that depends on the lower and upper bounds of the unknown membership functions is given to construct an FD filter with varying gains. It is shown that the switching-type FD filter with varying gains can achieve a better FD performance than the linear FD filter with fixed gains.