



The 19th Chinese Control Conference

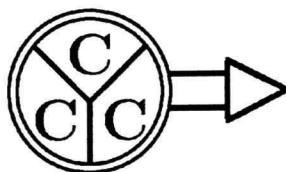
*6 – 8 December 2000
Hong Kong, China*

*Proceedings of CCC 2000
Volume 1 of 2*



CCC 2000

The Nineteenth Chinese Control Conference



**6 – 8 December 2000
Sheraton Hong Kong**

**Proceedings
Volume 1 of 2**

Editors:	Hua-Shu Qin	Lei Guo	Wei Huo
	Da-Zhong Zheng	Ji-Feng Zhang	C.W. Chan
	J. Lam	K.L. Mak	D.W.C. Ho

Organizers:



Chinese Association of Automation

***Control, Automation and Instrumentation
Division, Hong Kong Institution of
Engineers***

Foreword

The year 2000 marks a new phase in the world's development, as it does also for the Chinese Control Conference. This year, as we celebrate the new millennium, the 19th Chinese Control Conference is being held in Hong Kong, the first time the Chinese Control Conference has been held outside the mainland. The conference is organised jointly by the Chinese Association of Automation (CAA) and the Control, Automation and Instrumentation (CAI) Division of the Hong Kong Institution of Engineers. It aims at providing a venue for academics and professionals in the area of systems and control to share their ideas, experiences and achievements, and to facilitate the transfer of advanced control technology to industries.

The response to the announcement of the 19th Chinese Control Conference was excellent. A total of 297 papers were received from the mainland, Hong Kong and the international community. After careful consideration by the Programme Committee, 160 papers were selected for oral presentation or poster presentation: 4 plenary papers will also be included and 3 papers nominated for the Guan Zhao Zhi Award will be presented during the conference. In the first two days of the conference, there will also be an exhibition of current automation and control equipment. A Round-Table Panel discussion with practitioners from industries and equipment manufacturers on "Future Trends in Automation and Control" will be held on the third day of the conference. This is to be followed by another panel discussion on future directions in the development of control theory and its applications.

The 19th Chinese Control Conference indeed marks an important step in its move towards internationalization, since colleagues from the mainland, Hong Kong, and overseas have joined hands in contributing efforts to both the Organizing Committee and the Programme Committee. We extend our sincere thanks to all members of these two committees for their excellent work in making the conference a success. Our special thanks go to Dr. C.W. Chan, the Co-chairman of the Organising Committee: his enthusiasm has made it possible for the conference to be successfully launched in Hong Kong under favourable sponsorship. We would also like to take this opportunity to extend our thanks here to the various sponsors for their generous support of the 19th Chinese Control Conference.

Finally, we look forward to making the Chinese Control Conference an even greater success in the new millennium, and we thank you again for your support and participation.

Professor K.L. Mak
The University of Hong Kong

Professor Lei Guo
Chinese Academy of Sciences

The 19th Chinese Control Conference

6-8 December 2000, Hong Kong

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- Chinese Association of Automation
- Control, Automation and Instrumentation
Division, Hong Kong Institution of Engineers

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Yi-Sheng Zhong, *China*
Kemin Zhou, *United States*

CCC 2000 WEDNESDAY 6 DECEMBER SESSIONS

Opening Ceremony: 9:00 – 9:15 Ballroom				
Plenary Lecture I: 9:15 – 10:00 Ballroom				
TITLE: 现代集成制造系统及其系统和控制问题 System and Control Problems in Contemporary Integrated Manufacturing Systems 吴澄, 清华大学 Cheng Wu, Tsinghua University				
Plenary Lecture II: 10:00 – 10:45 Ballroom				
TITLE: Information and Complexity in Control Systems Le Yi Wang, Wayne State University				
Track	1	2	3	4
Room	Sung I	Sung II	Ming I	Ming II
<u>Wed</u> <u>11:00</u> to <u>12:20</u>	WA1 DEDS, Hybrid Systems (I)	WA2 Modeling, Identification and Adaptive Control (I)	WA3 Stochastic Systems and Control	WA4 Nonlinear Systems (I)
<u>Wed</u> <u>13:30</u> to <u>15:10</u>	WM1 DEDS, Hybrid Systems (II)	WM2 Modeling, Identification and Adaptive Control (II)	WM3 Distributed Parameter Systems (I)	WM4 Short-listed Papers for Award
<u>Wed</u> <u>15:30</u> to <u>16:50</u>	WP1 DEDS, Hybrid Systems (III)	WP2 Modeling, Identification and Adaptive Control (III)	WP3 Distributed Parameter Systems (II)	WP4 Nonlinear Systems (II)

CCC 2000 THURSDAY 7 DECEMBER SESSIONS

Plenary Lecture III: 9:00 – 9:45 Ballroom					
TITLE: Generating Chaos by Feedback Control for Engineering Applications Guanrong Chen, City University of Hong Kong					
Plenary Lecture IV: 9:45 – 10:30 Ballroom					
TITLE: Design and Stability Issues for Systems with Actuator Saturation C.W. Chan, The University of Hong Kong					
Track	1	2	3	4	5
Room	Sung I	Sung II	Ming I	Ming II	
<u>Thu</u> <u>10:50</u> to <u>12:10</u>	TA1 Linear Systems (I)	TA2 Neural Networks, Fuzzy Control (I)	TA3 Nonlinear Systems (III)	TA4 Signal Processing (I)	PT1 Dynamic Systems (Theory and Applications) (Poster)
<u>Thu</u> <u>13:30</u> to <u>15:10</u>	TM1 Linear Systems (II)	TM2 Variable Structure Control	TM3 Robustness and Robust Control (I)	TM4 Signal Processing (II)	PT2 Manufacturing and Robotic Systems (Poster)
<u>Thu</u> <u>15:30</u> to <u>16:50</u>	TP1 Linear Systems (III)	TP2 Neural Networks, Fuzzy Control (II)	TP3 Robustness and Robust Control (II)	TP4 Nonlinear Systems (IV)	PT3 Neural Networks, Fuzzy Logic and Intelligent Control (Poster)
<u>Thu</u> <u>19:00</u>	Banquet (Elite City Seafood Restaurant)				

CCC 2000 FRIDAY 8 DECEMBER SESSIONS

Track	1	2	3	4	5	
Room	Sung I	Sung II	Ming I	Ming II	Tang I & II	
<u>Fri</u> <u>9:00</u> <u>to</u> <u>10:40</u>	FA1 Intelligent Control	FA2 Robustness and Robust Control (III)	FA3 Manufacturing Systems and Robotics	FA4 Industrial and Process Control	<u>Fri</u> <u>9:00</u> <u>to</u> <u>10:00</u>	FA7 Industrial Applications of Automation
<u>Fri</u> <u>11:00</u> <u>to</u> <u>12:20</u>	FA5 PID Control	FA6 Fault Diagnosis			<u>Fri</u> <u>10:20</u> <u>to</u> <u>12:20</u>	Round-Table Discussion: Future Trend in Automation and Control
<u>Fri</u> <u>14:00</u> <u>to</u> <u>16:00</u>	Panel Discussion (Ballroom) Challenges for Control in the New Century: Theory and Practice					
<u>Fri</u> <u>16:20</u> <u>to</u> <u>16:50</u>	Closing Ceremony and Prize Presentation (Ballroom)					

19th Chinese Control Conference

6 DEC 2000 (Wed)

Ballroom

Plenary Lecture I (Page 1)
09:15 - 10:00

现代集成制造系统及其系统和控制问题

System and Control Problems in Contemporary Integrated
Manufacturing Systems

吴澄
清华大学
Wu, Cheng
Tsinghua University

Plenary Lecture II (Page 4)
10:00 - 10:45

Information and Complexity in Control Systems

Wang, Le Yi
Wayne State Univ.

Sung I

WA1

DEDS、混杂系统(一)

DEDS, Hybrid Systems (I)

Chair: Zheng, Da-Zhong Tsinghua Univ.
Co-Chair: Chen, Wende Chinese Acad. of Scis.

11:00 WA1-1 (Page 28)

Robust Control for a Class of DEDS

Zhao, Qianchuan Tsinghua Univ.
Zheng, Da-Zhong Tsinghua Univ.

11:20 WA1-2 (Page 33)

An Application of Hierarchical Hybrid Control Theory to
Automotive Powertrain Systems

Caines, Peter E. McGill Univ.
Shaikh, M. Shahid McGill Univ.

11:40 WA1-3 (Page 38)

M/G/1排队系统的性能灵敏度分析

殷保群 中国科学技术大学
奚宏生 中国科学技术大学

12:00 WA1-4 (Page 43)

Reachability and Controllable Sequences of Extended Timed
Event Graphs

Chen, Wende Chinese Acad. of Scis.
Zhuo, Zhibing Chinese Acad. of Scis.

Sung II

WA2

建模、辨识、自适应控制(一)

Modeling, Identification and Adaptive Control (I)

Chair: Guo, L. Chinese Acad. of Scis.
Co-Chair: 丛爽 (Cong, Shuang) 中国科学技术大学

11:00 WA2-1 (Page 49)

A Characterization of Adaptive Stabilizability of LTV Systems
with Hidden Markovian Jumps

Xue, F.
Guo, L.

Chinese Acad. of Scis.
Chinese Acad. of Scis.

11:20 WA2-2 (Page 54)

离散型非线性自适应反馈控制

丛爽 中国科学技术大学
谢亮亮 中国科学院

11:40 WA2-3 (Page 59)

具有不确定未知界的相似组合系统的指数实用稳定分散自
适应输出反馈控制

张霄力 东北大学
刘粉林 东北大学
赵军 东北大学

12:00 WA2-4 (Page 64)

鲁棒变结构模型参考自适应控制器: 控制增益切换方法

林岩 北京航空航天大学
毛剑琴 北京航空航天大学

Ming I

WA3

随机系统与控制

Stochastic Systems and Control

Chair: Yong, Jiongmin Fudan Univ.
Co-Chair: Mao, Xuerong Univ. of Strathclyde

11:00 WA3-1 (Page 70)

Existence of Optimal Portfolios via Stochastic Control and
Backward Stochastic Differential Equations

Yong, Jiongmin Fudan Univ.

11:20 WA3-2 (Page 76)

Robustness of Stability of Stochastic Differential Delay
Equations with Markovian Switching

Mao, Xuerong Univ. of Strathclyde

11:40 WA3-3 (Page 81)

Three-Rate State-Space Models for Stochastic Multivariable
Continuous-Time Control Systems and their Simulation

Astrov, Igor Tallinn Technical Univ.
Em, Juri Tallinn Technical Univ.
Rüstern, Ennu Tallinn Technical Univ.

12:00 WA3-4 (Page 86)

A Subspace State-Space Identification of Closed-loop Systems
based on Stochastic Realization

Huang, Dongliang Kyoto Univ.
Katayama, Tohru Kyoto Univ.

Ming II

WA4

非线性系统(一)

Nonlinear Systems (I)

Chair: Cheng, Daizhan Chinese Acad. of Scis.
Co-Chair: Hong, Yiguang Chinese Acad. of Scis.

11:00 WA4-1 (Page 91)

Stabilization of Nonlinear Systems with Oscillatory Center

Cheng, Daizhan Chinese Acad. of Scis.
Spurgeon, Sarah Univ. of Leicester

11:20 WA4-2 (Page 97)

A Geometric Approach for a Class of Output Feedback
Regulation Problems with Symmetry

Lum, Kai-Yew DSO National Lab.

Bloch, Anthony M.	Univ. of Michigan	14:30	WM2-4	(Page 146)
11:40	WA4-3	(Page 102)		
<i>Disturbance Decoupling with Constant Measurement Feedback for MIMO Nonlinear Systems</i>				
Zheng, Yufan	Univ. of Melbourne			
Zhang, Cishen	Univ. of Melbourne			
12:00	WA4-4	(Page 107)		
<i>Feedback Equivalent Forms of Forced Hamiltonian Systems</i>				
Hong, Yiguang	Chinese Acad. of Scis.			
Xi, Zairong	Chinese Acad. of Scis.			
Cheng, Daizhan	Chinese Acad. of Scis.			
Qin, Huashu	Chinese Acad. of Scis.			
Sung I				
WM1				
DEDS、混杂系统 (二)				
DEDS, Hybrid Systems (II)				
Chair: 费树岷 (Fei, Shumin)	东南大学			
Co-Chair: Xu, Cheng-Zhong	Univ. de Metz			
13:30	WM1-1	(Page 110)		
一类混杂系统的鲁棒控制				
王泽宁	东南大学			
费树岷	东南大学			
冯纯伯	东南大学			
13:50	WM1-2	(Page 114)		
一类混合动态系统的能控性和能观性研究				
谢广明	清华大学			
郑大钟	清华大学			
14:10	WM1-3	(Page 118)		
具有偏序结构的一般网络系统的关键路径与扰动分析问题				
李勇建	南开大学			
涂革生	南开大学			
14:30	WM1-4	(Page 124)		
<i>Boundary Feedback Stabilization of a Hybrid System</i>				
Xu, Cheng-Zhong	Univ. de Metz			
Chentouf, Boumediene	Univ. de Metz			
Sallet, Gauthier	Univ. de Metz			
Sung II				
WM2				
建模、辨识、自适应控制 (二)				
Modeling, Identification and Adaptive Control (II)				
Chair: Zhou, Tong	Tsinghua Univ.			
Co-Chair: Ren, Xuemei	Beijing Inst. of Tech.			
13:30	WM2-1	(Page 129)		
<i>Identification of ARX Systems</i>				
Chen, Han-Fu	Chinese Acad. of Scis.			
13:50	WM2-2	(Page 135)		
<i>Probabilistic Model Set Validation with Coprime Factor Uncertainties Based on Closed-loop Experiment Data</i>				
Zhou, Tong	Tsinghua Univ.			
14:10	WM2-3	(Page 141)		
<i>Identification of Dynamic Nonlinear Systems Using Recurrent Neural Networks</i>				
Ren, Xuemei	Beijing Inst. of Tech.			
Sung I				
WM3				
分布参数系统 (一)				
Distributed Parameter Systems (I)				
Chair: Feng, De-Xing	Chinese Acad. of Scis.			
Co-Chair: Li, Yong	Beijing Inst. of Control Eng.			
13:30	WM3-1	(Page 156)		
<i>Boundary Uniform Stabilization of Wave Equations with Variable Coefficients</i>				
Feng, Shao-Ji	Chinese Acad. of Scis.			
Feng, De-Xing	Chinese Acad. of Scis.			
13:50	WM3-2	(Page 161)		
<i>Stability of Distributed Systems under Output Feedback and its Applications in Smart Structure</i>				
Li, Yong	Beijing Inst. of Control Eng.			
Onoda, Junjiro	Inst. of Space and Astro. Sci.			
Minesugi, Kenji	Inst. of Space and Astro. Sci.			
14:10	WM3-3	(Page 166)		
<i>Boundary Exact Controllability for Naghdi's Models</i>				
Yao, Peng-Fei	Chinese Acad. of Scis.			
14:30	WM3-4	(Page 171)		
用微弱局部反馈控制产生时空混沌				
卢俊国	南京理工大学			
汪小帆	南京理工大学			
魏荣	南京理工大学			
王执铨	南京理工大学			
Ming II				
WM4				
请奖论文				
Short-listed Papers for Award				
Chair: 冯纯伯 (Feng, Chunbo)	东南大学			
13:30	WM4-1	(Page 175)		
Sugeno型模糊逻辑控制器逼近C函数的构造性充分条件				
陈卫田	曲阜师范大学			
14:00	WM4-2	(Page 181)		
<i>Observability Estimate: a Direct Method</i>				
Zhang, Xu	Sichuan Univ.			
14:30	WM4-3	(Page 187)		
<i>Linearization and Stabilization of Brockett Integrator</i>				
Sun, Zhendong	Beijing Univ. of Aero. & Astro			
Sung I				
WP1				
DEDS、混杂系统 (三)				
DEDS, Hybrid Systems (III)				
Chair: 涂革生 (Tu, Fengsheng)	南开大学			

Co- Chair: Liu, Shu Tang South China Univ. of Tech.

15:30 WP1-1 (Page 193)
单机拖后时间总和和问题交付期扰动时最优调度不变范围的一种求法

李建更 华北电力大学
涂肇生 南开大学
马海涛 天津电力工程建设监理公司

15:50 WP1-2 (Page 198)
Sharp Conditions for the Oscillation of a Class of Discrete Dynamical Systems

Liu, Yong Qing South China Univ. of Tech.
Liu, Shu Tang South China Univ. of Tech.

16:10 WP1-3 (Page 201)
Object-oriented Colored Timed Petri Net for FF Systems

Wang, Zhi Chinese Acad. of Scis.
Yu, HaiBin Chinese Acad. of Scis.
Wang, Tianran Chinese Acad. of Scis.
Song, Guoning Chinese Acad. of Scis.

Sung II

WP2

建模、辨识、自适应控制 (三)

Modeling, Identification and Adaptive Control (III)

Chair: Chen, Zongji Beijing Univ. of Aero. & Astro.
Co-Chair: Fang, Hai-Tao Chinese Acad. of Scis.

15:30 WP2-1 (Page 207)
Detection and Isolation of Control Surface Effectiveness Loss in Aircraft by Using Filter Bank Approach

Chen, Zongji Beijing Univ. of Aero. & Astro.
Yang, Shuo Beijing Univ. of Aero. & Astro.
Li, Weiqee Beijing Univ. of Aero. & Astro.

15:50 WP2-2 (Page 212)
Modeling of Nonlinear Dynamic Systems Using Support Vector Neurofuzzy Networks

Chan, C. W. Univ. of Hong Kong
Chan, W. C. Univ. of Hong Kong
Cheung, K. C. Univ. of Hong Kong
Harris, C. J. Univ. of Southampton

16:10 WP2-3 (Page 217)
Large Signal Modeling of Quasi-Resonant Converters Using Regulated Unified Model

Choi, C. T. Hong Kong Poly. Univ.
Li, C. K. Hong Kong Poly. Univ.

16:30 WP2-4 (Page 222)
Asymptotic Behavior of Asynchronous Stochastic Approximation

Fang, Hai-Tao Chinese Acad. of Scis.
Chen, Han-Fu Chinese Acad. of Scis.

Ming I

WP3

分布参数系统 (二)

Distributed Parameter Systems (II)

Chair: Liu, Kangsheng Zhejiang Univ.
Co- Chair: Yam, L. H. Hong Kong Poly. Univ.

15:30 WP3-1 (Page 228)
Exponential Stabilization of String Equation by Local Viscoelasticity

Liu, Kangsheng
Liu, Zhuangyi

Zhejiang Univ.
Univ. of Minnesota

15:50 WP3-2 (Page 231)
Basis Property for the Boundary Stabilization of a Rayleigh Beam Equation

Guo, Bao-Zhu Beijing Inst. of Tech.
Zhang, Yu-Feng Yan Bian Univ.

16:10 WP3-3 (Page 237)
A Direct and Elementary Proof of the Stabilization for the Wave Equation with Nonlinear Internal Damping

Zhang, Wei-Tao Chinese Acad. of Scis.

16:30 WP3-4 (Page 242)
Robust Determination of Sensor Locations for Vibration Control of Thin Plate Systems

Li, Y. Y. Fuzhou Univ.
Yam, L. H. Hong Kong Poly. Univ.
Leung, T. P. Hong Kong Poly. Univ.

Ming II

WP4

非线性系统 (二)

Nonlinear Systems (II)

Chair: Tian, Yu-Ping Southeast Univ.
Co-Chair: Mei, Shengwei Tsinghua Univ.

15:30 WP4-1 (Page 247)
Smooth Exponential Stabilization of Nonholonomic Systems via Time-varying Feedback

Tian, Yu-Ping Southeast Univ.
Li, Shihua Southeast Univ.

15:50 WP4-2 (Page 253)
Fast and Robust Control of Power Systems: A Finite-time Approach

Wang, Yuzhen Chinese Acad. of Scis.
Hong, Yiguang Chinese Acad. of Scis.
Cheng, Daizhan Chinese Acad. of Scis.
Qin, Huashu Chinese Acad. of Scis.

16:10 WP4-3 (Page 258)
Nonlinear Disturbances Attenuation Control for ASVG

Mei, Shengwei Tsinghua Univ.
Liu, Feng Tsinghua Univ.
Lu, Qiang Tsinghua Univ.

16:30 WP4-4 (Page 264)
具有刚性和旋转反馈的非线性控制系统的绝对稳定性

廖晓昕 华中科技大学
刘妹琴 华中科技大学
傅予力 华中科技大学
沈铁 华中科技大学

7 DEC 2000 (Thu)

Ballroom

Plenary Lecture III (Page 14) 09:00 - 09:45

Generating Chaos by Feedback Control for Engineering Applications

Chen, Guanrong
City Univ. of Hong Kong

Plenary Lecture IV (Page 20) 09:45 - 10:30

Design and Stability Issues for Systems with Actuator Saturation

Chan, C. W.
Univ. of Hong Kong

Sung I

TA1

线性系统 (一)

Linear Systems (I)

Chair: 赵军 (Zhao, Jun) 东北大学
Co-Chair: Lu, Guoping Nantong Inst. of Tech.

11:50 TA1-1 (Page 267)
线性开关系统稳定性的一个代数条件
赵军 东北大学

11:10 TA1-2 (Page 271)
Strict Positive Realness for Linear Systems with Multiple Time-delays
Lu, Guoping Nantong Inst. of Tech.
Shen, Shide Nantong Inst. of Tech.
Zhai, Qiliang Nantong Teachers' College

11:30 TA1-3 (Page 276)
连续分片线性函数的紧凑表示
李星野 清华大学
王书宁 清华大学
王万宾 清华大学

11:50 TA1-4 (Page 281)
采样系统 L_1 稳定控制器研究
吴俊 浙江大学
褚健 浙江大学
胡剑波 浙江大学

Sung II

TA2

神经网络、模糊控制 (一)

Neural Networks, Fuzzy Control (I)

Chair: Chen, Wei Ji Univ. of Macao
Co-Chair: 慕春棣 (Mu, Chundi) 清华大学

10:50 TA2-1 (Page 286)
Fuzzy Control of Double Stages Inverted Pendulum System
Lei, Kam Kin Univ. of Macao
Chen, Wei Ji Univ. of Macao

11:10 TA2-2 (Page 289)

水下自航器纵向运动的神统网络稳定自适应控制

施阳 清华大学
慕春棣 清华大学
严卫生 西北工业大学
李俊 西北工业大学
徐德民 西北工业大学

11:30 TA2-3 (Page 293)

模糊推理的Zadeh型全蕴涵三I算法

宋士吉 东南大学
冯纯伯 东南大学
费树岷 东南大学
孙长银 东南大学

11:50 TA2-4 (Page 297)

Hopfield神经网络的平衡态结构分析

李玉莹 北京邮电大学

Ming I

TA3

非线性系统 (三)

Nonlinear Systems (III)

Chair: Chen, Guanrong City Univ. of Hong Kong
Co-Chair: 曾建平 (Zeng Jianping) 北京航空航天大学

10:50 TA3-1 (Page 301)
Chaotifying Minimum Phase Systems via Time-Delay Feedback Control

Wang, Xiao Fan City Univ. of Hong Kong
Chen, Guanrong City Univ. of Hong Kong
Man, Kim F. City Univ. of Hong Kong

11:10 TA3-2 (Page 306)

Nonlinear Control and State Space Adjustments

De Souza, J. F. UBI

11:30 TA3-3 (Page 311)

混沌系统的参数脉冲控制

唐芳 北京航空航天大学
邱琦 北京航空航天大学

11:50 TA3-4 (Page 314)

一般 H_∞ 控制问题降阶控制器的存在性

曾建平 北京航空航天大学
张力军 北京航空航天大学

Ming II

TA4

信号处理 (一)

Signal Processing (I)

Chair: Zhang, Cishen Univ. of Melbourne
Co-Chair: 罗安 (Luo, An) 中南工业大学

10:50 TA4-1 (Page 320)

Mixed H_2/H_∞ Deconvolution of Uncertain Periodic FIR Channels

Wang, Song Univ. of Melbourne
Xie, Lihua NTU
Zhang, Cishen Univ. of Melbourne

11:10 TA4-2 (Page 325)

Roundoff Noise Analysis and Minimization of a Modified Delta Direct-form IIR Structure

Wong, Ngai Univ. of Hong Kong
Ng, Tung-Sang Univ. of Hong Kong

11:30

TA4-3

(Page 330)

电网谐波分析及综合滤除系统的研制

罗安

中南工业大学

李正国

中南工业大学

白李沙

中南工业大学

11:50

TA4-4

(Page 334)

New Technique in Proving the Linear Structure of Ω -Matrix in Nonlinear Filtering Systems with Finite Dimensional Estimation Algebras

Wu, Xi

Univ. of Illinois at Chicago

Yau, Stephen S.-T.

Univ. of Illinois at Chicago

Chen, Jie

Pioneer InfoTech Corp.

Chiou, Wen-Lin

Fu-Jen Univ.

PT1

动态系统 (理论与应用)

Dynamic Systems (Theory and Applications)

Chair: Choi, S. H

Univ. of Hong Kong

Co-Chair: Yuan, Jing

Hong Kong Poly. Univ.

10:50-12:10

PT1-1

(Page 657)

An Adaptive Controller for Nonminimum Phase Plants

Yuan, Jing

Hong Kong Poly. Univ.

10:50-12:10

PT1-2

(Page 662)

Modelling for Optimal Control of SLS Process

Choi, S. H.

Univ. of Hong Kong

Samavedam, S.

Univ. of Hong Kong

Chan, Amy M. M.

Univ. of Hong Kong

10:50-12:10

PT1-3

(Page 667)

Almost Disturbance Decoupling for Nonlinear Singular Systems

Wang, Xiaohua

Chinese Acad. of Scis.

Qin, Huashu

Chinese Acad. of Scis.

10:50-12:10

PT1-4

(Page 671)

二阶线性定常滞后中立型变结构控制系统的分析与综合

高存臣

烟台师范学院

李美贞

烟台师范学院

10:50-12:10

PT1-5

(Page 677)

Analysis and Design for Third Order Nonlinear Continuous Extended States Observer

Huang, Yi

Chinese Acad. of Scis.

Wan, Hui

Chinese Acad. of Scis.

Song, Jinlai

Chinese Acad. of Scis.

10:50-12:10

PT1-6

(Page 682)

月球软着陆非线性跟踪制导控制方法

王大轶

北京控制工程研究所

李铁寿

北京控制工程研究所

马兴瑞

中国航天科技集团公司

严辉

北京控制工程研究所

10:50-12:10

PT1-7

(Page 687)

催化裂化反应器多变量预测协调控制设计

田学民

石油大学

黄德先

石油大学

袁璞

石油大学

10:50-12:10

PT1-8

(Page 690)

On Existence and Parameterization of Solutions to Stable, Proper and Rational Fractional Matrix Equations $AX+YB=E$

and $AXB-YC=-D$

Xie, Li

City Univ. of Hong Kong

Tso, S. K.

City Univ. of Hong Kong

10:50-12:10

PT1-9

(Page 695)

A Robust Controller Improving Disturbance Rejection in Speed Control of Induction Motors Compared with Classical PID Controller

Sun, Kai

Tsinghua Univ.

Feng, Guang

Tsinghua Univ.

Huang, Lippei

Tsinghua Univ.

Zhu, Dongqi

Tsinghua Univ.

10:50-12:10

PT1-10

(Page 700)

Solving the Discrete-Time Output Regulation Problem with Taylor Series Method

Wang, Dan

Chinese Univ. of Hong Kong

Huang, Jie

Chinese Univ. of Hong Kong

10:50-12:10

PT1-11

(Page 705)

The Effect of Control Gains on Nonlinear Response of a Rotor-Magnetic Bearing System

Leung, A. Y. T.

City Univ. of Hong Kong

Ji, J. C.

City Univ. of Hong Kong

TM1

线性系统 (二)

Linear Systems (II)

Chair: Zhang, Ji-Feng

Chinese Acad. of Scis.

Co-Chair: 张霖 (Zhang, Lin)

清华大学

13:30

TM1-1

(Page 339)

An LMI Approach to Static Output Feedback Stabilization of Linear Systems

Wang, Jin-Zhi

Chinese Acad. of Scis.

Zhang, Ji-Feng

Chinese Acad. of Scis.

13:50

TM1-2

(Page 343)

广义系统的LMI区域稳定性

赵克友

青岛大学

14:10

TM1-3

(Page 347)

An LMI Approach to Decentralized Stabilization of Large-Scale Interconnected Time-Delay Systems

Xu, Bugong

South China Univ. of Tech.

Xu, Yifang

South China Univ. of Tech.

Lam, James

Univ. of Hong Kong

14:30

TM1-4

(Page 351)

线性大范围相互关联的多重时滞系统稳定性分析

刘湘黔

北方交通大学

张容梅

清华大学

张霖

清华大学

14:50

TM1-5

(Page 355)

Robustness Bound of LQ Guaranteed Cost Control Systems for Parameter Uncertainties

Xue, Anke

Hangzhou Inst. of E. E.

Sun, Youxian

Zhejiang Univ.

Sung II

TM2

变结构控制

Variable Structure Control

Chair: 霍伟 (Huo, Wei) 北京航空航天大学
Co-Chair: 胡跃明 (Hu, Yueming) 华南理工大学

13:30 TM2-1 (Page 359)

一类非线性不确定系统的“棒-棒”控制算法
朱进国 北京航空航天大学
霍伟 北京航空航天大学

13:50 TM2-2 (Page 364)

基于非线性系统高阶滑模的变结构控制
胡跃明 华南理工大学
晁红敏 华南理工大学

14:10 TM2-3 (Page 370)

Application of Variable Structure Control and Neural Networks in Plant
Mkrttchian, Vardan SEUA
Lazaryan, Anri SEUA
Tsintsadze, Aleko GTU
Iashvili, Genady GTU

14:30 TM2-4 (Page 375)

Sliding Mode Control for Linear Uncertain Systems
Zhang, J. R. Univ. de Picardie Jules
Rachid, A. Univ. de Picardie Jules
Xu, S. J. Harbin Inst. of Tech.

14:50 TM2-5 (Page 380)

基于邻区域搜索的分片线性函数的最优化方法
高林 清华大学
王书宁 清华大学
王伟 清华大学

Ming I

TM3

鲁棒分析与控制 (一)

Robustness and Robust Control (I)

Chair: 黄琳 (Huang, Lin) 北京大学
Co-Chair: Lee, Francis C. HKIVE

13:30 TM3-1 (Page 384)

混合不确定系统的鲁棒性能
安森建 北京理工大学
黄琳 北京大学

13:50 TM3-2 (Page 390)

μ -analysis for Robust Control in Spacecraft with Large Appendages
Lee, Francis C. HKIVE

14:10 TM3-3 (Page 394)

Delta算子系统圆形区域极点配置的鲁棒性
张瑞金 郑州大学
吴捷 华南理工大学
王忠勇 郑州大学

14:30 TM3-4 (Page 398)

控制器与对象同时摄动的鲁棒控制问题：离散系统
段志生 北京大学
黄琳 北京大学
王龙 北京大学

14:50 TM3-5 (Page 404)

Robustness Analysis for Singular and Impulsive Delay Systems with Time-Varying Uncertainties

Guan, Zhi-Hong Huazhong Univ. of Sci. & Tech.
Liao, Rui-Quan Huazhong Univ. of Sci. & Tech.
Sun, De-Bao Huazhong Univ. of Sci. & Tech.
Lam, James Univ. of Hong Kong

Ming II

TM4

信号处理 (二)

Signal Processing (II)

Chair: Ho, Daniel W. C. City Univ. of Hong Kong
Co-Chair: 毛剑琴 (Mao, Jianqin) 北京航空航天大学

13:30 TM4-1 (Page 410)

A Training and Pruning Algorithm for Wavelet Neural Networks
Xu, Jinhua City Univ. of Hong Kong
Ho, Daniel W. C. City Univ. of Hong Kong
Zhou, Ding-Xuan City Univ. of Hong Kong

13:50 TM4-2 (Page 415)

Numerical Implementation Considerations in Applying the QFT Stability Theorem
Wu, Wei Texas A&M Univ.
Jayasuriya, Suhada Texas A&M Univ.

14:10 TM4-3 (Page 420)

A Modified Simulated Annealing Algorithm for Optimal Vibration Control of Flexible Structures
Zhang, Hongwei Univ. of Manchester
Lennox, Barry Univ. of Manchester
Goulding, Peter R. City Univ. of Hong Kong
Leung, Andrew Y. T. City Univ. of Hong Kong

14:30 TM4-4 (Page 425)

小波技术在信号处理中的一种应用
李合生 北京航空航天大学
毛剑琴 北京航空航天大学
张富堂 中国工程物理研究院

14:50 TM4-5 (Page 430)

基于不同邻域函数的模拟退火算法性能研究
王凌 清华大学
郑大钟 清华大学

PT2

制造与机器人系统

Manufacturing and Robotic Systems

Chair: Fung, Eric H. K. Hong Kong Poly. Univ.
Co-Chair: 宋靖雁 (Song, Jingyan) 清华大学

13:30-15:10 PT2-1 (Page 710)

A Survey of EDICT Supervisory Control Method
Li, Y. M. THMI
Wang, M. Z. THMI
Jones, A. H. Univ. of Salford

13:30-15:10 PT2-2 (Page 715)

基于LPV方法的机器人鲁棒 H_∞ 控制
虞忠伟 同济大学
胡东 同济大学
陈辉堂 同济大学

13:30-15:10	PT2-3	(Page 720)
不确定环境下移动机器人的运动控制		
李贻斌	山东大学	
李彩虹	山东大学	
刘明	山东大学	
周凤余	山东大学	
宋锐	山东大学	
13:30-15:10	PT2-4	(Page 724)
<i>A Stochastic Model for the Control of Intelligent Assembly Robots</i>		
Mak, K. L.	Univ. of Hong Kong	
Lau, H. Y. K.	Univ. of Hong Kong	
Ngan, M. C. C.	Univ. of Hong Kong	
13:30-15:10	PT2-5	(Page 729)
<i>A Control Model for Automated Assembly Systems with a Multi-agent Architecture</i>		
Lau, H. Y. K.	Univ. of Hong Kong	
Mak, K. L.	Univ. of Hong Kong	
Lee, I. S. K.	Univ. of Hong Kong	
13:30-15:10	PT2-6	(Page 734)
<i>ARMAX Modeling of 2-D Workpiece Errors in Lathe Turning</i>		
Leung, Steve K. S.	Hong Kong Poly. Univ.	
Fung, Eric H. K.	Hong Kong Poly. Univ.	
13:30-15:10	PT2-7	(Page 738)
高速公路收费数据拆分表的矩阵计算方法		
杜海宁	清华大学	
宋靖雁	清华大学	
张毅	清华大学	
13:30-15:10	PT2-8	(Page 743)
<i>Analysis, Design and Application of a New Practical Iterative Learning Control Scheme</i>		
Dou, Huifang	NUS	
Tan, Kok Kiong	NUS	
Tang, Kok Zuea	NUS	
Chen, YangQuan	STI	
13:30-15:10	PT2-9	(Page 748)
Hough变换在车牌子图像定位中的应用		
安永泉	华北工学院	
禹健	华北工学院	
郭圣权	华北工学院	
樊永康	北方自动化研究所	
13:30-15:10	PT2-10	(Page 753)
<i>Walking Triple-inverted Pendulum</i>		
Yang, Yawei	Beijing Univ. of Aero. & Astr.	
Zhang, Minglian	Beijing Univ. of Aero. & Astr.	
Sun, Changling	Beijing Univ. of Aero. & Astr.	
13:30-15:10	PT2-11	(Page 759)
<i>System Design, Modelling, and Control of a Four-Wheel-Steering Mobile Robot</i>		
Makatchev, Maxim	City Univ. of Hong Kong	
McPhee, John J.	Univ. of Waterloo	
Tso, S. K.	City Univ. of Hong Kong	
Lang, Sherman Y. T.	IMTI	

Sung I

TP1

线性系统 (三)

Linear Systems (III)

Chair: 郁文生 (Yu, Wensheng)

中国科学院

Co-Chair: Liu, Kang-Zhi

Chiba Univ.

15:30 TP1-1

(Page 435)

时滞微分系统全时滞稳定的代数判定

郁文生

中国科学院

王龙

北京大学

15:50 TP1-2

(Page 440)

Nonlinear Control Approach to Linear Systems with Constant Input Norm Constraint: Application to Rotational Crane Systems

Liu, Kang-Zhi

Chiba Univ.

Ouchi, Shigeto

Tokai Univ.

16:10 TP1-3

(Page 445)

CADCS的发展方向与ADVMATH软件的研制

叶庆凯

北京大学

王肇明

北京大学

文伶

北京大学

16:30 TP1-4

(Page 449)

用构造性方法解Morgan问题

许可康

中国科学院

Sung II

TP2

神经网络、模糊控制 (二)

Neural Networks, Fuzzy Control (II)

Chair: Huang, Jie

Chinese Univ. of Hong Kong

Co-Chair: 刘士荣 (Liu, Shirong)

宁波大学

15:30 TP2-1

(Page 454)

基于神经网络的自适应极点配置控制器

王蛟

北京邮电大学

彭力

北京科技大学

韩存武

北京邮电大学

15:50 TP2-2

(Page 457)

广义基函数神经模糊网络的结构优化及其应用

刘士荣

宁波大学

俞金寿

华东理工大学

16:10 TP2-3

(Page 463)

200MW汽轮发电机组振动故障的模糊诊断系统

杨萃

华南理工大学

冯永新

广东省电力工业局

16:30 TP2-4

(Page 468)

Approximate Output Regulation with the RTAC System

Zhao, Jijun

Chinese Univ. of Hong Kong

Ng, Chi Fai

Chinese Univ. of Hong Kong

Wang, Jin

Chinese Univ. of Hong Kong

Huang, Jie

Chinese Univ. of Hong Kong

Ming I

TP3

鲁棒分析与控制 (二)

Robustness and Robust Control (II)

Chair: Wang, Long

Peking Univ.

Co-Chair: Tam, Hei Ka

Univ. of Hong Kong

15:30 TP3-1 (Page 473)
Robust Minimum-time Deadbeat Regulation: An Explicit Solution
 Tam, Hei Ka Univ. of Hong Kong
 Lam, James Univ. of Hong Kong

15:50 TP3-2 (Page 477)
On Robust Sensitivity Functions and Related Problems
 Wang, Long Peking Univ.
 Ackermann, J. German Aero. Research Center
 Yu, Wensheng Chinese Acad. of Scis.

16:10 TP3-3 (Page 483)
 控制系统的非光滑综合
 韩京清 中国科学院

16:30 TP3-4 (Page 489)
Finite-Time Tracking Control of Nonholonomic Integrator
 Lan, Chun-hua Chinese Acad. of Scis.
 Hong, Yiguang Chinese Acad. of Scis.
 Qin, Huashu Chinese Acad. of Scis.

Ming II

TP4

非线性系统 (四)

Nonlinear Systems (IV)

Chair: Chan, W. C. Univ. of Hong Kong
 Co-Chair: Chen, Pengnian China Inst. of Metrology

15:30 TP4-1 (Page 494)
A Stability Theorem for Discrete Time Systems and Its Application to Stabilization of Nonlinear Systems
 Chen, Pengnian China Inst. of Metrology
 Qin, Huashu Chinese Acad. of Scis.
 Xu, Shiyong China Inst. of Metrology

15:50 TP4-2 (Page 499)
 一类不确定非线性系统的鲁棒输出反馈跟踪
 张侃健 东南大学
 冯纯伯 东南大学
 费树岷 东南大学

16:10 TP4-3 (Page 504)
Comparison of ANN, dynamical systems and support vector approaches for river discharge prediction
 Jayawardena, A. W. Univ. of Hong Kong
 Fernando, T. M. K. G. Univ. of Hong Kong
 Chan, C. W. Univ. of Hong Kong
 Chan, W. C. Univ. of Hong Kong

16:30 TP4-4 (Page 509)
Apply Primitive Element Theorem to Nonlinear Control Systems
 Li, Shurong Univ. of Petroleum

PT3

神经网络、模糊与智能控制

Neural Networks, Fuzzy Logic, and Intelligent Control

Chair: 柴天佑 (Cai, Tianyou) 东北大学
 Co-Chair: 孙秀霞 (Sun, Xiuxia) 空军工程大学

15:30-16:50 PT3-1 (Page 764)
 智能控制技术在烧结球团焙烧过程优化控制中的应用
 于政军 东北大学
 柴天佑 东北大学

陈雪波 鞍山钢铁学院

15:30-16:50 PT3-2 (Page 768)
 一种新的CDMA模糊功率控制方法
 谢林 北京邮电大学
 韩存武 北京邮电大学

15:30-16:50 PT3-3 (Page 772)
An Intelligent Realization for Control Valve Performance
 Li, Pingkang Northern Jiaotong Univ.
 Liu, Tuo Northern Jiaotong Univ.

15:30-16:50 PT3-4 (Page 776)
 分级集成神经网络诊断模型及在远程诊断中的应用研究
 黎洪生 武汉工业大学
 史铁林 华中理工大学
 杨叔子 华中理工大学

15:30-16:50 PT3-5 (Page 782)
 单神经元自适应控制PSD在再热汽温控制中的应用
 赵锡龄 太原理工大学
 焦云婷 太原理工大学

15:30-16:50 PT3-6 (Page 786)
Research and Application of Dancer Roll Control System Based on RBF Neural Networks
 Wang, Qingchao Harbin Inst. of Tech.
 Cen, Xiaofeng Harbin Inst. of Tech.
 Yan, Liming Harbin Inst. of Tech.
 Yu, Baocai Daqing Petri. Plant
 Wang, Jine Daqing Petri. Plant

15:30-16:50 PT3-7 (Page 790)
 基于LMI的多目标特征结构配置方法及其应用
 孙秀霞 空军工程大学
 林岩 北京航空航天大学
 毛剑琴 北京航空航天大学

15:30-16:50 PT3-8 (Page 795)
 一种改进的稳定自适应模糊控制
 张天平 扬州大学工学院
 严彩梅 扬州大学工学院
 朱范德 扬州大学工学院

15:30-16:50 PT3-9 (Page 800)
 采用模糊PID控制的火电厂过热汽温串级系统
 谢克明 太原理工大学
 牟昌华 太原理工大学
 谢刚 太原理工大学

8 DEC 2000 (Fri)

Sung I

FA1

智能控制

Intelligent Control

Chair: Xi, Yugeng

Shanghai Jiaotong Univ.

Co-Chair: Yeung, L. F.

City Univ. of Hong Kong

09:00 FA1-1

(Page 512)

Satisfactory Optimization Control in Fuzzy Dynamic Environment for Complex Systems

Xi, Yugeng

Shanghai Jiaotong Univ.

Li, Shaoyuan

Shanghai Jiaotong Univ.

09:20 FA1-2

(Page 518)

Predictive Control Based on Fuzzy Goals and Fuzzy Constraints

Li, Shaoyuan

Shanghai Jiaotong Univ.

Xi, Yugeng

Shanghai Jiaotong Univ.

09:40 FA1-3

(Page 523)

一种新型的非线性规划神经网络

黄远灿

北京理工大学

付梦印

北京理工大学

王庆林

中国科学院

10:00 FA1-4

(Page 528)

一种改进遗传算法及其在原料采购优化中的应用

桂卫华

中南工业大学

黄泰松

中南工业大学

阳春华

中南工业大学

10:20 FA1-5

(Page 532)

Input-Output Variable Block Assignment Problem with Genetic Algorithm

Yeung, L. F.

City Univ. of Hong Kong

Chan, K. Y.

City Univ. of Hong Kong

Wu, Angus

City Univ. of Hong Kong

Sung II

FA2

鲁棒分析与控制 (三)

Robustness and Robust Control (III)

Chair: Zhong, Yi-Sheng

Tsinghua Univ.

Co-Chair: 吴敏 (Wu, Min)

中南工业大学

09:00 FA2-1

(Page 537)

Robust Stabilization of a Class of Nonlinear Time-varying Uncertain Systems with Multiple Delays

Zhong, Yi-Sheng

Tsinghua Univ.

09:20 FA2-2

(Page 543)

Randomized Algorithms for Optimal Robust Performance Controller Design

Song, Chunlei

Peking Univ.

Wang, Long

Peking Univ.

Huang, Lin

Peking Univ.

09:40 FA2-3

(Page 549)

有结构不确定性的关联大系统分散 H_∞ 输出反馈控制

陈宁

中南工业大学

桂卫华

中南工业大学

吴敏

中南工业大学

10:00 FA2-4

(Page 553)

Further Results on Robust Nonlinear H_∞ Control

Lu, Guoping

Nantong Inst. of Tech.

Ho, Daniel W. C.

City Univ. of Hong Kong

Yeung, L. F.

City Univ. of Hong Kong

10:20 FA2-5

(Page 558)

Associative Memory-based Robotic Manipulator Intelligent Control System

Xu, Ning-Shou

Beijing Polytechnic Univ.

Wang, Jun-Song

Beijing Polytechnic Univ.

Feng, Weining

Univ. of Houston-Downtown

Ming I

FA3

制造系统、机器人

Manufacturing Systems and Robotics

Chair: 谭民 (Tan, Min)

中国科学院

Co-Chair: Zhu, Yunmin

Sichuan Univ.

09:00 FA3-1

(Page 564)

Thermal Design for the Reliability of Robot Controller Box

Huang, Yong

Chinese Acad. of Scis.

Tan, Min

Chinese Acad. of Scis.

09:20 FA3-2

(Page 569)

空间机器人捕获目标的鲁棒自适应控制

吴宏鑫

北京控制工程研究所

王昊瀛

北京控制工程研究所

09:40 FA3-3

(Page 575)

欠驱动机构控制的一种非光滑设计方法

侯增广

中国科学院

谭民

中国科学院

韩京清

中国科学院

10:00 FA3-4

(Page 579)

On the Equivalence Classes of Fusion Rules for Distributed Multisensor Decision Systems

Zhu, Yunmin

Sichuan Univ.

You, Zhisheng

Sichuan Univ.

10:20 FA3-5

(Page 584)

Robust Nonlinear Control of Rigid Robots Driven by Induction Motors

Guerrero-Ramirez, Gerardo

CENIDET

Tang, Yu

DEPFI-UNAM

Ming II

FA4

工业与过程控制

Industrial and Process Control

Chair: 万百五 (Wan, Baiwu)

西安交通大学

Co-Chair: 赖晓平 (Lai, Xiaoping)

山东大学

09:00 FA4-1

(Page 589)

工业生产的产品质量模型和质量控制模型及其应用

万百五

西安交通大学

09:20 FA4-2

(Page 595)

Practical Application of Principal Component Analysis

Wang, X.

Univ. of Manchester

Lennox, B.

Univ. of Manchester

Goulding, P. R.

Univ. of Manchester

Leung, A. Y. T.

City Univ. of Hong Kong

09:40	FA4-3	(Page 600)	11:40	FA6-3	(Page 647)
电力负荷短期预测的HMNN模型			控制系统故障检测的 ℓ^1 优化方法		
赖晓平 山东大学			方华京 华中理工大学		
周鸿兴 山东大学					

10:00	FA4-4	(Page 605)	12:00	FA6-4	(Page 652)
<i>Dynamics and Control of a Pilot Hydrotreating Plant</i>			非线性系统的鲁棒故障检测与诊断		
Lababidi, Haitham M. S. Kuwait Univ.			魏晨 北京航空航天大学		
Alatqi, Imad M. Kuwait Univ.			陈宗基 北京航空航天大学		
Ali, Yusuf I. Kuwait Univ.					

10:20	FA4-5	(Page 610)	Tang I & II		
<i>A Generalised Score Definition of the Partial Least Squares Algorithm for the Monitoring of Industrial Processes</i>			FA7		
Kruger, Uwe Univ. of Manchester			Industrial Applications of Automation		
Wang, Xun Univ. of Manchester			Chair: Sze, W. S. Univ. of Hong Kong		
Chen, Qian Univ. of Manchester					
Leung, Andrew Y. T. City Univ. of Hong Kong			9:00 FA7-1		
			<i>New Developments in Building Automation and Control</i>		
			Johnson Controls		

FA5

PID控制

PID Control

Chair: 胡包钢 (Hu, Baogang)	中国科学院
Co-Chair: 沈德耀 (Shen, Deyao)	中南工业大学

11:00	FA5-1	(Page 615)
钢铁工业配煤过程的神经网络专家系统		
吴敏	中南工业大学	
沈德耀	中南工业大学	
桂卫华	中南工业大学	

11:20	FA5-2	(Page 620)
<i>Optimum Tuning of PID Controllers Based on Step Response</i>		
Jiang, Xinhua	Changsha Railway Univ.	
Li, Jianghong	Shanghai Jiaotong Univ.	

11:40	FA5-3	(Page 626)
PID控制与神经网络的结合及PID神经网络非线性控制系统		
舒怀林	广州大学	

12:00	FA5-4	(Page 631)
一维模糊PID控制器的圆判据稳定性分析		
王守唐	中国科学院	
高东杰	中国科学院	
胡包钢	中国科学院	

Sung II

FA6

故障诊断

Fault Diagnosis

Chair: 周东华 (Zhou, Donghua)	清华大学
Co-Chair: 魏晨 (Wei, Chen)	北京航空航天大学

11:00	FA6-1	(Page 636)
闭环系统的小故障检测与分离方法		
赵琦	清华大学	
周东华	清华大学	

11:20	FA6-2	(Page 642)
<i>Fault Diagnosis for a Class of Nonlinear Dynamical Systems with Unknown Fault Matrix</i>		
Wang, Y.	Univ. of Hong Kong	
Chan, C. W.	Univ. of Hong Kong	
Cheung, K. C.	Univ. of Hong Kong	

现代集成制造系统及其系统和控制问题

(详细摘要)

吴澄

清华大学

e-mail:wuc@tsinghua.edu.cn

1. 引言

现代集成制造系统 (Contemporary Integrated Manufacturing Systems) 是信息时代的先进生产系统, 它将信息技术、现代管理技术和制造技术综合应用于企业产品全生命周期 (从市场需求分析到最终报废处理) 的各个阶段。通过信息集成、过程优化及资源优化, 实现物流、信息流、价值流的集成和优化运行, 达到人 (组织、管理)、经营和技术三要素的集成。以加强企业新产品开发的 T、Q、C、S、E (清洁生产)、K (自主创新), 从而提高企业的市场应变能力和竞争能力。

这是一种普遍存在的系统: 凡是人造物, 都离不开设计、制造及相应的管理。

这是一种对国家经济、安全至关重要的系统。

这是一种复杂的人机大系统, 提出了大量的尚待解决的新问题, 包括理论问题。

863 计划实施以来, 每年约 3000 人的研究与实践, 对如何解决这是系统的设计与优化问题作了大量的工作, 取得了明显的效果, 但其相关理论, 还处于初始阶段。

2. 系统的复杂性

功能的复杂性: 系统包含了产品从规划设计到最终交付用户使用的一切活动。如产品设计开发过程、加工制造过程、经营管理过程 (包括销售及服务等) 等。不仅有物流的活动, 还有大量的人的活动。

对象的复杂性: 相当一部分过程和活动, 很难完全用一般的动力学系统模型、离散事件系统模型及混杂系统模型来描述。

随机性: 影响系统性能的随机因素大量、经常存在: 市场、原材料零部件的供应、合同、价格、设备的损坏, 人员的流动等等。

目标/约束的多样性: 企业市场竞争力的提高, 表现在多个方面, 如 T、Q、C、S、K、E 等等。

解决这样的复杂系统的理论进展还大大落后于实际应用的需求。

3. 复杂问题求解的基本框架——多层面的综合集成及综合管 (理) 控 (制)

复杂问题的求解一般不能只限于某一个层面。综合集成、综合管控是一种可行的解决方案。

基本框架:

管理层面 (包括生产组织模式)。理念与模式、定性

方法论层面, 宏观技术, 多数仍为定性

实现技术层面, 中观及微观的实现

数学等理论工具层面, 微观的理论分析、综合

3.1 管理 (包括生产组织模式)

有大量的先进的管理理念, 如集成制造; (推式) 计划的生产组织; 精良生产与“拉式”生产组织; 经营过程重组; 协作生产的组织模式 (不是“小而全”“大而全”) 等等。

这些理念与计划经济的生产模式和管理方法是对立的。

管理层面对企业的影响是至关重要的。

3.2 方法论

体系结构的概念 (系统结构); 开放系统的概念—标准化; 企业建模的方法论, 如功能模型、信息模型、决策模型、组织模型、资源模型、动态模型等等。

方法论不在数学层次解决问题, 但重要的在于将问题纳入一个正确的方向。多数情况下, 方法论主要还在定性阶段, 但对某些问题, 如大型软件开发采用功能模型便十分有效, 对数据库系统的设计与实现, 信息模型是主要工具。

3.3 实现技术

解决如何建立一个现代集成制造系统。