

The IEEE Singapore International Symposium on Control Theory and Applications

(SISCTA'97)

29-30 July 1997

Hilton International Singapore

Final Program

Plenary Session I (9:30-10:30)

Chair: S. H. Tan, National University of Singapore, Singapore

Co-chair: Y. X. Sun, Zhejiang University, China

Conservation laws and performance limitations in control

R. H. Middleton, The University of Newcastle, Australia

Tea Break, 10:30 - 11:00

Session TA1: Nonlinear Control I

Chair: Lihua Xie, Nanyang Technological University, Singapore

Co-chair: Goetz Grammel, University of South Australia, Australia

11:00 - 11:20

Discretization of nonlinear control systems

Goetz Grammel, University of South Australia, Australia

11:20 - 11:40

A design of nonlinear model following control systems

Weizheng Liu, Shigenori Okubo, Tianbing Li, Yamagata University, Japan

11:40 - 12:00

Nonlinear and fault tolerant control of separately excited DC motors

X. Xia, T. H. Lee, S. S. Ge, National University of Singapore, Singapore

12:00 - 12:20

L2-gain control of uncertain nonlinear systems with triangular structure

Weizhou Su, Lihua Xie and Zhiming Gong, Nanyang Technological University,

Session TA2: Robust Control I

Chair: Sri R. Kolla, Bowling Green State University, USA

Co-chair: T. Fernando, The University of Western Australia, Australia

11:00 - 11:20

On the stability robustness of discrete-time large-scale systems

Sri R. Kolla, Bowling Green State University, USA

11:20 - 11:40

A robustness bound for parameter uncertain systems with LQ guaranteed cost controller

Anke Xue, You-Xian Sun, Zhejiang University, PRC

11:40 - 12:00

The design method of robust servo systems with quadratic stability using output feedback

Taro Tsujino, Takao Fujii, Osaka University, Japan

12:00 - 12:20

A special transcendental problem and simultaneous stabilization of three plants

Session TA3: Applications I

Chair: Tieying Song, Beijing Forestry University, PRC

Co-chair: J. X. Xu, National University of Singapore, Singapore

11:00 - 11:20

A forest thinning control policy under the stochastic-prices models

Tieying Song, Beijing Forestry University, PRC

11:20 - 11:40

Adaptive control of hard disk head with runout compensation

Xu Jian-Xin, Siri Weerasooriya, Lee Allen, National University of Singapore, Singapore

11:40 - 12:00

Static sliding mode control of a PM stepper motor

M. Zribi, H. N. Ngai, L. H. Xie, Nanyang Technological University, Singapore; H. Sira-Ramirez, Universidad de Los Andes, Venezuela

12:00 - 12:20

Development of dual actuator/controller

Session TA4: Neural Networks

Chair: Kun Soo Chang, Pohang University of Science and Technology, Korea

Co-chair: Xiaoming Xu, Shanghai Jiao Tong University, PRC

11:00 - 11:20

A pattern based adaptive controller design for use based on neural nets

Ge Ming, You-Xian Sun, Zhejiang University, PRC

11:20 - 11:40

Neural networks based identification tool for the CAE platform of fuzzy control systems

J.-J. Yu, S. Tan, C.-C. Hang, National University of Singapore, Singapore

11:40 - 12:00

Landmark detection using neural networks

Woon Kok Meng, Ngee Ann Polytechnic, Singapore

12:00 - 12:20

Dynamic modelling of the nonlinear chemical processes based on modular neural network

<p>Singapore</p> <p>12:20 - 12:40 Receding horizon control and output regulation of nonlinear processes R. Pytlak, T. P. Stadler, Imperial College of Science, Technology and Medicine, UK</p> <p>12:40 - 13:00 Order reduction for nonlinear systems by re-iterated averaging G. Grammel, University of South Australia, Australia</p>	<p>Jianbo He, Qing-Guo Wang, T.H. Lee, National University of Singapore, Singapore</p> <p>12:20 - 12:40 Robust pole-assignment in a sector for uncertain dynamical systems T. Fernando, The University of Western Australia, Australia; H. Trinh, James Cook University of North Queensland, Australia</p> <p>12:40 - 13:00 Robust stabilization of uncertain dynamic systems with multiple time-varying delayed states and controls -- LMI approach Chuwang Cheng, You-Xian Sun, Zhejiang University, PRC</p>	<p>for future HDD T.B. Goh, S Weerasooriya, Ben M. Chen, T.H. Lee, National University of Singapore, Singapore</p> <p>12:20 - 12:40 Application of nonlinear PI controllers to DC motor control Fang Lin Luo, Zuozong Liu, Nanyang Technological University, Singapore</p> <p>12:40 - 13:00 DSP-controlled PWM L-converter used for PM DC motor drive Fang Lin Luo, Nanyang Technological University, Singapore</p>	<p>Kwang Gi Min, Chonghun Han, and Kun Soo Chang, Pohang University of Science and Technology, Korea</p> <p>12:20 - 12:40 On-line tracking of multiple manoeuvring targets using neural networks Gee Wah Ng, DSO National Laboratories, Singapore</p> <p>12:40 - 13:00 A stable neural network controller for dynamic system Jun Song, Xiaoming Xu, Shanghai Jiao Tong University, PRC</p>
<p>Lunch in Hilton Hotel, 13:00-14:30</p>			
<p>Plenary Session II (14:30-15:30) Chair: Y. Y. Wang, Nanyang Technological University, Singapore Co-chair: C. C. Yu, National Taiwan Institute of Technology, Taiwan</p> <p>Old mathematics and new applications: system modeling and control theory in biomedicine and pattern analysis Raghu Raghavan, Centre for Information Enhanced Medicine, National University of Singapore, Singapore</p>			
<p>Tea Break, 15:30 - 16:00</p>			
<p>Session TP1: Process Control</p> <p>Chair: Hsiao-Ping Huang, National Taiwan University, Taiwan Co-chair: In-Beum Lee, Pohang University of Science and Technology, Korea</p> <p>16:00 - 16:20 Autotuning for process having single unstable pole</p>	<p>Session TP2: Robotics</p> <p>Chair: Shinichi Sagara, Kyushu Institute of Technology, Japan Co-chair: Danwei Wang, Nanyang Technological University, Singapore</p> <p>16:00 - 16:20 Digital adaptive control of space robot manipulator using simplified kinematic</p>	<p>Session TP3: Linear Control</p> <p>Chair: K. Y. Zhu, Nanyang Technological University, Singapore Co-chair: Guo Zhi, Nanjing University of Science and Engineering, PRC</p> <p>16:00 - 16:20 Decentralized controller design for multimachine power systems</p>	<p>Session TP4: Fuzzy</p> <p>Chair: C.-L. Chen, National Taiwan University, Taiwan Co-chair: G. Feng, University of South Wales, Australia</p> <p>16:00 - 16:20 A crisp-type fuzzy logic controllers using parametric t-norm-sum-gravity inference</p>

<p>Hsiao-Ping Huang, Chan-Cheng Chen, National Taiwan University, Taiwan</p> <p>16:20 - 16:40 Output feedback control with specified gain and phase margins Ichijyo Hodaka, Noboru Sakamoto, Masayuki Suzuki, Nagoya University, Japan</p> <p>16:40 - 17:00 Enhanced relay feedback method Su Whan Sung, In-Beum Lee, Pohang University of Science and Technology, Korea</p> <p>17:00 - 17:20 Indirect feedforward liquid level control Kwo-Liang Wu, Cheng-Ching Yu, National Taiwan Institute of Technology, Taiwan</p> <p>17:20 - 17:40 Comparative studies of iterative learning control schemes for a batch chemical process Yangquan Chen, Jian-Xin Xu, T.H. Lee, National University of Singapore, Singapore Shigehiko Yamamoto, Kogakuin University</p> <p>17:40 - 18:00 Hybrid differential evolution for parameter estimation of a batch bioprocess Ji-Pyng Chiou, Feng-Sheng Wang, National Chung Cheng University, Taiwan</p>	<p>and dynamic equations Shinichi Sagara, Fujio Ohkawa, Ryoza Katoh, Kyushu Institute of Technology, Japan</p> <p>16:20 - 16:40 Neural network control of flexible joint manipulators in constrained motion L. C. Woon, S. S. Ge, National University of Singapore, Singapore; X. Q. Chen, Nanyang Technological University, Singapore</p> <p>16:40 - 17:00 Singular model and decomposition of mobile robot motions Danwei Wang, Nanyang Technological University, Singapore</p> <p>17:00 - 17:20 Vision based servo control of a 3-DOF robot manipulator Hu Yamin, H. Krishnan, K.B. Lim, National University of Singapore, Singapore</p> <p>17:20 - 17:40 Fuzzy control of SCARA robot M. J. Er, S. Y. Teh, and Alvin J. H. Lee, Nanyang Technological University</p> <p>17:40 - 18:00 An approach to robust trajectory tracking for industrial manipulators D. Wang, C. Wen, Y. Wang, and N. Zhang, Nanyang Technological University, Singapore</p>	<p>Youyi Wang, Nanyang Technological University, Singapore; David J. Hill, The University of Sydney, Australia; Guoxiao Gu, Nanyang Technological University, Singapore</p> <p>16:20 - 16:40 A new MIMO system independent-loop design method with applications H. Yu, John Moores University, UK; T. C. Yang, University of Sussex, UK; Z. T. Ding, Ngee Ann Polytechnic, Singapore</p> <p>16:40 - 17:00 Simplified Implementation of smith predictor and its tuning Wei-Dong Zhang, You-Xian Sun, Zhejiang University, PRC</p> <p>17:00 - 17:20 A generalized predictive decoupling control for MIMO systems K. Y. Zhu, S. M. Krishnan, Nanyang Technological University, Singapore</p> <p>17:20 - 17:40 A polynomial approach to decentralized control analysis and design Qing-Guo Wang, Tong-Heng Lee, and Jian-Bo He, National University of Singapore, Singapore</p> <p>17:40 - 18:00 General proof of eigenvalue placement in different specified domain condition Guo Zhi, Hu Jinchun, Wang Hui, Nanjing University of Science and Engineering, PRC</p>	<p>methods Cheng-Liang Chen, Yeong-Chih Lai, Chung-Tyan Hsieh, Tzxy-Chyi Wang, National Taiwan University, Taiwan</p> <p>16:20 - 16:40 Finding global minimum using multi-scale fuzzy technique Li Zhang, Shaohua Tan, National University of Singapore, Singapore</p> <p>16:40 - 17:00 Stability design of a fuzzy PD+D² controller for uncertain dynamic Systems Yang-Ming Pok, Ngee Ann Polytechnic, Singapore; Jian-Xin Xu, National University of Singapore, Singapore</p> <p>17:00 - 17:20 On universal fuzzy controllers S.G. Cao, N.W. Rees, G. Feng, University of New South Wales, Australia</p> <p>17:20 - 17:40 A new approach to generate fuzzy system Chunhui Zhong, Xuejun Wang, Liang Cheng, Xizhi Shi, Shanghai Jiao Tong University, PRC</p> <p>17:40 - 18:00 Design and implementation of a fuzzy logic control of static phase shifter for damping power system sub-synchronous resonance Tjing T. Lie, W. W. L. Keerthipala, F.M. Hew, C. W. Ong, Nanyang Technological University, Singapore</p>
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Plenary Session III (9:30-10:30)

Chair: Q. G. Wang, National University of Singapore, Singapore

Co-chair: H. Wang, The University of Manchester, UK

Low gain feedback: A powerful emerging design technology

Zongli Lin , University of Virginia, USA

Tea Break, 10:30 - 11:00

Session WA1: Nonlinear Control II

Chair: J. L. Wang, Nanyang Technological University, Singapore

Co-chair: Z. T. Ding, Ngee Ann Polytechnic, Singapore

11:00 - 11:20

Analysis and design of high precision servo systems with dynamic friction

T. H. Lee, Yaolong Lou, S. S. Ge, National University of Singapore, Singapore

11:20 - 11:40

Feedback Linearization for affine nonlinear systems using neural networks and a dynamic backpropagation algorithm

Jianliang Wang, Teck Wuen Low, and Eng Hwee Tan, Nanyang Technological University, Singapore

11:40 - 12:00

Adaptive neural decentralized predictive control

D. H. Wang and C. B. SOH, Nanyang Technological University, Singapore

12:00 - 12:20

Coordinated motion and force control of a

Session WA2: Applications II

Chair: R. H. Middleton, The University of Newcastle, Australia

Co-chair: Marco H. Terra, University of Sao Paulo, Brazil

11:00 - 11:20

A ROM-less PC / 32-bit controller card bus interface design implemented using VHDL

B. K. Teng, S. S. Ge, C. C. Hang, National University of Singapore, Singapore

11:20 - 11:40

Discrete adaptive state feedback control and its application to the liquid container transfer system

H. Ohtsuka, I. Mizumoto, Z. Iwai, Kumamoto University, Japan

11:40 - 12:00

Robust and perfect tracking control of a free gyro stabilized mirror system

B. C. Siew, Ben M. Chen and T. H. Lee, National University of Singapore, Singapore

Session WA3: Robust Control II

Chair: Zongli Lin, State University of New York, USA

Co-chair: Min-Sen Chiu, National University of Singapore, Singapore

11:00 - 11:20

Solutions to general H^∞ almost disturbance decoupling problem with measurement feedback and internal stability for discrete-time systems

Zongli Lin, University of Virginia, USA; Ben M. Chen, National University of Singapore, Singapore; Yacov Shamash, State University of New York, USA; Jun He, National University of Singapore, Singapore

11:20 - 11:40

H_∞ control of descriptor systems with scheduling parameter

Kazuya SATO, Keigo WATANABE, Saga University, Japan; Masahiro OYA, Toshihiro KOBAYASHI, Kyushu Institute of Technology, Japan

11:40 - 12:00

Memoryless H_∞ controllers for delayed

Session WA4: Modeling

Chair: S. S. Ge, National University of Singapore, Singapore

Co-chair: H. Ikeuchi, Kyushu Institute of Technology, Japan

11:00 - 11:20

A new approach for semiphysical modelling for unknown dynamic systems

H. Wang, A. Afouxendis, The University of Manchester, UK

11:20 - 11:40

Multivariable modelling and control for building energy management

G. S. Virk, University of Portsmouth, UK; D. L. Loveday, Loughborough University, UK; D. Azzi, A. K. M. Azad, University of Portsmouth, UK

11:40 - 12:00

Characterisation of human stair walking by wavelet analysis

H. Ikeuchi, Oita University, Japan; K. Shinkoda, University Hospital of Occupational and Environmental Health, Japan; R. Katoh, Kyushu Institute of Technology, Japan; M. Sato, Kitakyushu National College of Technology; T.

<p><i>Cartesian arm and a rotary table</i> S. S. Ge, National University of Singapore, Singapore; X. Q. Chen, Nanyang Technological University, Singapore; S. Xie, D. L. Gu, National University of Singapore, Singapore</p> <p>12:20 - 12:40 <i>Asymptotics of Lyapunov exponents</i> G. Grammel, P. Shi, University of South Australia, Australia</p> <p>12:40 - 13:00 <i>Adaptive control of nonlinear systems with unknown virtual control coefficients</i> Zhengtao Ding, Ngee Ann Polytechnic, Singapore</p>	<p>12:00 - 12:20 <i>A study of two recoverable target loop structures for arbitrary and definite target loop via output feedback control</i> Marco H. Terra, University of Sao Paulo, Brazil</p> <p>12:20 - 12:40 <i>Fundamental constraints for the inverted pendulum problem</i> A. R. Woodyatt, R. H. Middleton, J. S. Freudenberg, The University of Newcastle, Australia</p> <p>12:40 - 13:00 <i>Rotational disturbance rejection on disk drives via adaptive acceleration compensation</i> G. Guo, Qinghua Li, Siri Weerasooriya, National University of Singapore, Singapore</p>	<p><i>linear systems using output feedback</i> Wei-Jie Mao, Yong-Yan Cao, You-Xian Sun, Zhejiang University, PRC</p> <p>12:00 - 12:20 <i>On the design of robust partially decentralized controllers</i> Teck Kiang Lee, Min-Sen Chiu, National University of Singapore, Singapore</p> <p>12:20 - 12:40 <i>Delay-dependent robust H_∞ control for uncertain systems with multiple state delays</i> Yong-Yan Cao, You-Xian Sun, Zhejiang University, PRC</p> <p>12:40 - 13:00 <i>Dynamic output feedback sliding mode control for linear uncertain systems with unstable transmission zeros</i> Sujit K. Bag, University of Leicester, UK</p>	<p>Yamashita, Kyushu Institute of Technology, Japan</p> <p>12:00 - 12:20 <i>A singularly perturbed mathematical model of Bacterial Gene regulation (Lac Operon)</i> Jihad S. Qaddour, Steven D. Werman, Prasanta Misra, Mesa State College, USA</p> <p>12:20 - 12:40 <i>Dynamic modelling of a smart material beam</i> S. S. Ge, T. H. Lee, J.Q. Gong, National University of Singapore, Singapore</p> <p>12:40 - 13:00 <i>A mathematical model for the closed-loop of Bacterial Gene regulation (Lac Operon System)</i> Jihad S. Qaddour, Mesa State College, USA</p>
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Lunch in Hilton Hotel, 13:00 - 14:30

<p>Session WP1: Complex Systems</p> <p>Chair: D. Z. Zheng, Tsinghua University, PRC Co-chair: Harald K. Wimmer, University of Wurzburg, Germany</p> <p>14:30 - 14:50 <i>Stable and real-time scheduling for a class of hybrid dynamic systems</i> Qian Chuan Zhao and Da Zhong Zheng, Tsinghua University, PRC</p>	<p>Session WP2: Identification and Adaptive Control</p> <p>Chair: Valentin Y. Arkov, University of Sheffield, UK Co-chair: Ying Zhang, Nanyang Technological University, Singapore</p> <p>14:30 - 14:50 <i>Dynamic model identification using spectral analysis: optimization approach</i> Valentin Y. Arkov, Russian Academy of Sciences, Russia; Gennady G. Kulikov, Ufa State Aviation Technical Univ, Russia</p>	<p>Session WP3: Optimal Control</p> <p>Chair: Y. F. Zheng, The University of Melbourne, Australia Co-chair: Jianbo He, National University of Singapore, Singapore</p> <p>14:30 - 14:50 <i>Performance of Periodically time varying controllers for sampled data control</i> Cishen Zhang, The University of Melbourne, Australia ; Jingxin Zhang, University of South Australia, Australia; Yu Fan Zheng, East China Normal University, China</p>	<p>Session WP4: Control Technology</p> <p>Chair: Y. Yu, Institute of System Science, Singapore Co-chair: M. Rohmanuddin, Bandung Institute of Technology, Indonesia</p> <p>14:30 - 14:50 <i>An intelligent hardware designer for digital controllers</i> Y. K. Loi, K. H. Liew, S. S. Ge, S. H. Tan, National University of Singapore, Singapore</p>
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<p>14:50 - 15:10 The extended linear complementarity problem and its applications in the analysis and control of discrete event systems and hybrid systems B. De Schutter, B. De Moor, ESAT/SISTA, Belgium</p> <p>15:10 - 15:30 Existence and uniqueness of the trajectory in hybrid systems Weidong He, Technical University of Denmark, Denmark</p> <p>15:30 - 15:50 Observer-based controller for a class of uncertain linear systems: a linear matrix inequality approach Eduardo F. Costa, M. H. Terra, Vilma A. Oliveria, University of Sao Paulo, Brazil</p> <p>15:50 - 16:10 Diagonal matrix solution of a discrete-time Lyapunov inequality Harald K. Wimmer, University of Wurzburg, Germany</p> <p>16:10 - 16:30 Dissipativity, passivity, and Riccati equation in pencil model Koki SHIBASATO, Kumamoto National College of Technology, Japan; Tetsuo SHIOTSUKI, Shigeyasu KAWAJI, Kumamoto University, Japan</p>	<p>14:50 - 15:10 A simple adaptive control strategy having any good performance for systems with unknown deterministic disturbances Masahiro OYA, Kyushu Institute of Technology, Japan; Kazuya SATO, Saga University, Japan; Toshihiro KOBAYASHI, Kyushu Institute of Technology, Japan</p> <p>15:10 - 15:30 Robust adaptive control of systems with arbitrary relative degree and unknown high frequency gain Ying Zhang, Changyun Wen, and Yeng Chai Soh, Nanyang Technological University, Singapore</p> <p>15:30 - 15:50 On identification of non-linear models with non-parameter estimation Jing-Ming Wang, Shanghai Tiedao University, PRC</p> <p>15:50 - 16:10 Minimum quadratic algorithm for identification of linear-in-the-parameters models Shaohua Tan, Qi Zhu, National University of Singapore, Singapore</p> <p>16:10 - 16:30 Fuzzy modeling and identification, a guide for the user Jairo J. Espinosa, Joos Vandewalle, Katholieke Universiteit Leuven</p>	<p>14:50 - 15:10 An algorithm for solving constrained linear quadratic optimal control problem Hussein Jaddu, Etsujiro Shimemura, Japan Advanced Institute of Science and Technology, Japan</p> <p>15:10 - 15:30 Robust linear quadratic control of systems with integral quadratic constraints Huaizhong Li, Labo. d'Automatique de Grenoble, France; Minyue Fu, University of Newcastle, Australia; Lihua Xie, Nanyang Technological University, Singapore</p> <p>15:30 - 15:50 Mixed μ-synthesis using H_2-based loop-shaping iteration Ciann-Dong Yang, National Cheng Kung University, Taiwan; Chia-Yuan Chang, Ford Lio Ho Motor Company Ltd, Taiwan; Yun-Ping Sun, National Cheng Kung University, Taiwan</p> <p>15:50 - 16:10 Kalman Filter Design for Interconnected singularly perturbed systems using optimal projection equations Jihad Qaddour, Mesa State College, USA</p> <p>16:10 - 16:30 LQR design for plants with single input delay Jianbo He, Qing-Guo Wang, Tong-Heng Lee, National University of Singapore, Singapore</p>	<p>14:50 - 15:10 Robot tentacles: dynamics and control of flexible arms R. Viswanathan, W. Lawton, T. Poston, R. Raghavan, Y. Yu, Institute of System Science, Singapore</p> <p>15:10 - 15:30 Fuzzy control algorithm of a multi-input multi-output system with strong interaction between variables Mohammad Rohmanuddin, THE Houw Liongm, Bandung Institute of Technology, Indonesia</p>
<p>Tea Break, 16:30 - 17:00, Banquet on Santosa Island, 18:00 - 22:00</p>			

