

AUTOMATIC CONTROL IN AEROSPACE

*Selected papers from the IFAC Symposium,
Tsukuba, Japan, 17–21 July 1989*

Edited by

T. NISHIMURA

*Institute of Space and Astronautical Science,
Sagamihara, Japan*

Published for the

INTERNATIONAL FEDERATION OF AUTOMATIC CONTROL

by

PERGAMON PRESS

Member of Maxwell Macmillan Pergamon Publishing Corporation
OXFORD · NEW YORK · BEIJING · FRANKFURT
SÃO PAULO · SYDNEY · TOKYO · TORONTO

CONTENTS

PLENARY SESSION

NASDA's Long-range Plan and Automatic Control M. NAGATOMO	1
The NASA Telerobotics Research Program R. RHOADS STEPHENSON	17

NAVIGATION, ATTITUDE DETERMINATION AND POINTING SYSTEMS

Dynamic Evaluation for the DRTS User Spacecrafts' Antenna Pointing System H. HASHIMOTO, S. MOTOHASHI, O. KAWAMOTO, Y. SHIMAMOTO	27
Control Design of an Antenna Pointing Control System with Large On-board Reflectors Y. KAWAKAMI, H. HOJO, M. UEBA	33
The Theoretical and Experimental Validation of the GPS-INS-STAR Hybrid Navigation System Concept M. HARIGAE, T. TANABE	39
Kalman Filter Based Range Estimation for Autonomous Navigation using Imaging Sensors B. SRIDHAR, V.H.L. CHENG, A.V. PHATAK	45
A Star Pattern Recognition Algorithm for Autonomous Attitude Determination R.W.H. VAN BEZOOIJEN	51
New Concept for Autonomous Rendezvous Approach Navigation and Guidance System using Only Target Image Information M. IKEUCHI, T. TANABE	59

SATELLITE ATTITUDE AND ORBITAL CONTROL SYSTEMS I

Attitude Control System for Engineering Test Satellite-VI T. KITAHARA, S. ICHIKAWA, Y. KAWADA, H. KISHIMOTO, M. MINE, H. SOGA, T. TORIUMI, Y. YAMAGUCHI, T. TANAMACHI	65
Attitude and Orbit Control Subsystem for MOS-1 T. MATSUEDA, T. SHIMODA, K. OKADA, T. YAMAGUCHI, H. KATO	75
Attitude and Orbit Control Subsystem for ERS-1 and its Subsystem Test T. SUZUKI, A. NAKASHIMA, K. YASUDA, N. NATORI	81

The Attitude and Orbit Control Subsystem of the EUTLSAT II Spacecraft H. BITTNER, H.D. FISCHER, J.-L. FROELIGER, K. MILTENBERGER, H. POPP, F. PORTE, M. SURAUER	87
---	----

SPACE ROBOTICS AND MANIPULATORS

Autonomous Navigation and Control of a Mars Rover D.P. MILLER, D.J. ATKINSON, B.H. WILCOX, A.H. MISHKIN	111
Simulation System for a Space Robot Using 6 Axis Servos H. SHIMOJI, M. INOUE, K. TSUCHIYA, K. NINOMIYA, I. NAKATANI, J. KAWAGUCHI	115
Theoretical and Experimental Study on In-Orbit Capture Operation with Satellite Mounted Manipulator Y. UMETANI, K. YOSHIDA	121
Simulation and Control of Space Manipulators Bearing Complex Payloads P. CARTON, J.P. CHRETIEN, M. MAURETTE	127
Experimental Implementation of a Nonlinear Estimator in the Control of Flexible Joint Manipulators M.G. HOLLARS, R.H. CANNON JR	133

INSTRUMENTS AND AERONAUTICAL SYSTEMS

A Review of Space Guidance and Control Equipment D.B. DEBRA, J. RODDEN	141
Noninteracting Control of Dynamically Tuned Dry Gyro and its Application to Measurement of Two-axis Angular Accelerations H. SHINGU, M. OTSUKI	147
Controller Designs of a Gust Load Alleviation System for an Elastic Rectangular Wing A. FUJIMORI, H. OHTA, P.N. NIKIFORUK	153
Study on Integrated Cockpit Display using Flight Simulator R. SEO, T. WATANABE, M. HIROSE, A. FUJIWARA, K. KOIKE, T. YAMAMOTO, C. SAKAMOTO	159
Robust Control for Large Space Structures: Spillover Suppression by Frequency-shaped Optimal Regulator T. KIDA, M. IKEDA	165
Active Stabilization of a Large Flexible Antenna Feed Support Structure M.S. ELBUNI, M. HIGASHIGUCHI	171
The Development of an Integrated Experiment to Study the Controls/Structures Interaction Problem in Large Optical Systems J.-N. AUBRUN, K.R. LORELL	177
Control of an Orbiting Platform Supported Tethered Satellite System P.K. LAKSHMANAN, V.J. MODI, A.K. MISRA	185

LAUNCH VEHICLES AND INTERPLANETARY VEHICLES

Hardware-in-the-loop Simulation for TR-I Rocket Roll Control System J. KOUCHIYAMA, Y. FUNO, S. OGAWA, T. FUJIWARA, M. NISHIDA, K. HASEGAWA	191
Robust Techniques Application for Attitude Control of a Launcher During Atmospheric Flight N. IMBERT, M. GAUVRIT, A. PIQUEREAU	197
Optimal Thruster Configurations for the GP-B Spacecraft P. WIKTOR, J.-H. CHEN, D. DEBRA	203
Integrated Flight/Propulsion Control: Requirements and Issues S.M. ROCK	209
The Cassini Titan Probe's Adaptive Descent Control K. SCHILLING, H. LEHRA	215
A Continuous Proportional Low-Thrust Propulsion System J.-H. CHEN, J. BULL, D.B. DEBRA	223
A Novel Dynamic Programming Algorithm and its Application to Optimal Low-Thrust Trajectory Generation for Space Mission T. HANAOKA	231

SATELLITE ATTITUDE AND ORBITAL CONTROL SYSTEMS II

The Hybrid Attitude Control System for the Geosynchronous Satellite S. ICHIKAWA, Y. KAWADA, M. MINE, H. SOGA, M. HARIGAE	237
Guidance and Control of Miniature Satellites R. FLEETER, R. WARNER	243
Automatic Control of Astronomical Satellites S. KAMPEN	249
Novel Concept for Autonomous Controller Design System Utilizing Machine Learning Applied to Satellite Attitude Control System Design Problem S. NAKASUKA, T. TANABE	255

FUTURE VEHICLES

Navigation and Guidance of the H-II Orbiting Plane T. IZUMI, T. SATO, S. TANAKA, Y. TAKIZAWA, T. KIMURA	261
Navigation, Guidance and Control Subsystem of Space Flyer Unit T. NISHIMURA, M. KAWACHI, T. YAMAGUCHI, M. SATO, K. TSUKAHARA	267
Design of the HERMES Orbital Flight Controller E. GOTTZEIN, K. JANSCHKEK, W. OESTERLIN, J. COLRAT	273
Author Index	283
Keyword Index	285