

1985

- No. 1 *PERKINS, MACFARLANE & LEININGER: Analysis and Synthesis of Control Systems
No. 2 *LJUNG & ÅSTRÖM: Identification, Adaptive and Stochastic Control
No. 3 *TITLI, SINGH, PACHTER, HAUTUS, KOKOTOVIC & RAUCH: Large-scale Systems,
Decision-making, Mathematics of Control
No. 4 *NISENFELD, LEFKOWITZ, PAI & DY LIACCO: Process Industries, Power Systems
No. 5 *REMBOLD, KEMPF, TOWILL, JOHANNSEN, PAUL, HARRISON, EHRENBERGER, TABAK,
LESKIEWICZ, FENTON & DEBRA: Manufacturing, Man-Machine Systems, Computers,
Components, Traffic Control, Space Applications
No. 6 *VOSSIUS, WEED, RESWICK, COBELLI, HAIMES, TAKAMATSU, KAYA, NAJIM,
MARTENSSON, CHESTNUT & LARSEN: Biomedical Applications, Water Resources,
Environment, Energy Systems, Development, Social Effects, SWIIS, Education
(*A Bridge between Control Science and Technology, Ninth Triennial World Congress,
General Editors: J. Gertler and L. Keviczky)
No. 7 BARKER & YOUNG: Identification and System Parameter Estimation (1985)

1986

- No. 1 NORRIE & TURNER: Automation for Mineral Resource Development
No. 2 CHRETIEN: Automatic Control in Space
No. 3 DA CUNHA: Planning and Operation of Electric Energy Systems
No. 4 VALADARES TAVARES & EVARISTO DA SILVA: Systems Analysis Applied to Water and Related
Land Resources
No. 5 LARSEN & HANSEN: Computer Aided Design in Control and Engineering Systems
No. 6 PAUL: Digital Computer Applications to Process Control
No. 7 YANG JIACHI: Control Science & Technology for Development
No. 8 MANCINI, JOHANNSEN & MARTENSSON: Analysis, Design and Evaluation of Man-machine
Systems
No. 9 GELLIE, FERRATE & BASANEZ: Robot Control "Syroco '85"
No. 10 JOHNSON: Modelling and Control of Biotechnological Processes

NOTICE TO READERS

If your library is not already a standing/continuation order customer or subscriber to this series, may we recommend that you place a standing/continuation or subscription order to receive immediately upon publication all new volumes. Should you find that these volumes no longer serve your needs your order can be cancelled at any time without notice.

Copies of all previously published volumes are available. A fully descriptive catalogue will be gladly sent on request.

ROBERT MAXWELL
Publisher

IFAC Related Titles

BROADBENT & MASUBUCHI: Multilingual Glossary of Automatic Control Technology
EYKHOFF: Trends and Progress in System Identification
ISERMANN: System Identification Tutorials (*Automatica Special Issue*)

AUTOMATIC CONTROL IN SPACE 1985

*Proceedings of the Tenth IFAC Symposium,
Toulouse, France, 24–28 June 1985*

Edited by

J. P. CHRETIEN

CERT/DERA, Toulouse, France

Published for the

INTERNATIONAL FEDERATION OF AUTOMATIC CONTROL

by

PERGAMON PRESS

OXFORD · NEW YORK · TORONTO · SYDNEY · FRANKFURT
TOKYO · SAO PAULO · BEIJING

U.K.	Pergamon Press, Headington Hill Hall, Oxford OX3 0BW, England
U.S.A.	Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, New York 10523, U.S.A.
CANADA	Pergamon Press Canada, Suite 104, 150 Consumers Road, Willowdale, Ontario M2J 1P9, Canada
AUSTRALIA	Pergamon Press (Aust.) Pty. Ltd., P.O. Box 544, Potts Point, N.S.W. 2011, Australia
FEDERAL REPUBLIC OF GERMANY	Pergamon Press GmbH, Hammerweg 6, D-6242 Kronberg, Federal Republic of Germany
JAPAN	Pergamon Press, 8th Floor, Matsuoka Central Building, 1-7-1 Nishishinjuku, Shinjuku-ku, Tokyo 160, Japan
BRAZIL	Pergamon Editora Ltda., Rua Eça de Queiros, 346, CEP 04011, São Paulo, Brazil
PEOPLE'S REPUBLIC OF CHINA	Pergamon Press, Qianmen Hotel, Beijing, People's Republic of China

Copyright © 1986 IFAC

All Rights Reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means: electronic, electrostatic, magnetic tape, mechanical, photocopying, recording or otherwise, without permission in writing from the copyright holders.

First edition 1986

British Library Cataloguing in Publication Data

Automatic control in space 1985 : proceedings of the tenth IFAC symposium, Toulouse, France, 24–28 June 1985.—(IFAC proceedings series; 1986, nr. 2)

I. Space vehicles—Automatic control

I. Chrétien, J. P. II. International Federation of Automatic Control III. Series
629.47'42 TL795

ISBN 0-08-032556-4

These proceedings were reproduced by means of the photo-offset process using the manuscripts supplied by the authors of the different papers. The manuscripts have been typed using different typewriters and typefaces. The lay-out, figures and tables of some papers did not agree completely with the standard requirements: consequently the reproduction does not display complete uniformity. To ensure rapid publication this discrepancy could not be changed: nor could the English be checked completely. Therefore, the readers are asked to excuse any deficiencies of this publication which may be due to the above mentioned reasons.

The Editor

TENTH IFAC SYMPOSIUM ON AUTOMATIC CONTROL IN SPACE 1985

Organized by

Centre d'Etudes et de Recherches de Toulouse (CERT)

Sponsored by

International Federation of Automatic Control (IFAC)
Technical Committee on Space

Co-sponsored by

Association Française pour la Cybernétique Economique et Technique (AFCET)

International Programme Committee

G. Bertoni, Italy

Daniel B. DeBra, USA

Eveline Gottzein, Germany

S. C. Gupta, India

Walter Haeussermann, USA

Minoru Higashiguchi, Japan

John W. Hursh, USA

J. C. Husson, France

Pieter Kant, Netherlands

A. J. Sarnecki, UK

E. Slachmuylders, The Netherlands

Igor N. Vasiljev, USSR

F. R. Vigneron, Canada

Yang Jia-chi, China

H. D. Zago, USA