

# JOURNAL OF DYNAMIC SYSTEMS, MEASUREMENT, AND

Ref: BLO98EPT97 PF 0711977 Dt: 26521687  
JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT & CONTROL  
01.12.98 Vol: 120 No. 4  
0022-0434 21872678 16.12.98  
LIBRIS  
144 BLVD KRIM BELKACEM  
ALGER  
ALGERIE

# Transactions of the ASME®

Dynamic Systems and  
Control Division  
Technical Editor, **W. BOOK**

Past Editors, **M. TOMIZUKA**  
**D. M. AUSLANDER**  
**J. L. SHEARER**  
**K. N. REID**  
**Y. TAKAHASHI**  
**M. J. RABINS**

Associate Technical Editors,  
**R. S. CHANDRAN (1998)**  
**E. COLGATE (1998)**  
**F. CONRAD (2001)**  
**E. FAHRENTHALD (2001)**  
**S. FASSOIS (2001)**  
**Y. HURMUZLU (2000)**  
**T. KURFESS (1999)**  
**E. MISAWA (1999)**  
**S. NAIR (2001)**  
**N. OLGAC (2000)**  
**G. RIZZONI (1999)**  
**B. SICILIANO (2000)**  
**A. SINHA (1999)**  
**V. UTKIN (1998)**  
**P. VOULGARIS (2001)**  
**WOONG-CHUL YANG (1998)**

Book Review Editor  
**ROSS R. ALLEN**

Executive Committee  
Chairman, **R. SHOURESHI**  
Past Chairman, **S. E. SHLADOVER**  
Vice Chairman, **A. G. ULSOY**  
Members, **G. MASADA,**  
**N. NATHOO**  
Secretary, **J. L. STEIN**

**BOARD ON COMMUNICATIONS**  
Chairman and Vice-President  
**R. K. SHAH**

**OFFICERS OF THE ASME**  
President, **W. M. PHILLIPS**

Executive Director  
**D. L. BELDEN**  
Treasurer  
**J. A. MASON**

**PUBLISHING STAFF**  
Managing Director, Engineering  
**CHARLES W. BEARDSLEY**

Director, Technical Publishing  
**PHILIP DI VIETRO**

Managing Editor, Technical Publishing  
**CYNTHIA B. CLARK**

Managing Editor, Transactions  
**CORNELIA MONAHAN**

Production Assistant  
**MARISOL ANDINO**

Transactions of the ASME, Journal of Dynamic Systems,  
Measurement and Control (ISSN 0022-0434) is published  
quarterly (Mar., June, Sept., Dec.) for \$205.00 per year by The  
American Society of Mechanical Engineers, Three Park  
Avenue, New York, NY 10016. Periodicals postage paid at  
New York, NY and additional mailing offices.

POSTMASTER: Send address changes to Transactions of the  
ASME, Journal of Dynamic Systems, Measurement, and  
Control, c/o THE AMERICAN SOCIETY OF MECHANICAL  
ENGINEERS, 22 Law Drive, Box 2300, Fairfield,  
NJ 07007-2300.

**CHANGES OF ADDRESS** must be received at Society  
headquarters seven weeks before they are to be effective.  
Please send old label and new address.

**PRICES:** To members, \$40.00, annually; to nonmembers,  
\$205.00. Add \$40.00 for postage to countries outside the  
United States and Canada.

**STATEMENT from By-Laws.** The Society shall not be  
responsible for statements or opinions advanced in papers or  
... printed in its publications (B7.1, Para. 3).

**COPYRIGHT © 1998** by The American Society of Mechanical  
Engineers. Authorization to photocopy material for internal or  
personal use under circumstances not falling within the fair  
use provisions of the Copyright Act is granted by ASME to  
libraries and other users registered with the Copyright  
Clearance Center (CCC) Transactional Reporting Service  
provided that the base fee of \$3.00 per article is paid directly  
to CCC, 222 Rosewood Drive, Danvers, MA 01923. Request  
for special permission or bulk copying should be addressed to  
Reprints/Permission Department. Reprints from this  
publication may be made on condition that full credit be given  
the TRANSACTIONS OF THE ASME, JOURNAL OF DYNAMIC  
SYSTEMS, MEASUREMENT, AND CONTROL, and the author,  
and date of publication be stated.

**INDEXED** by Applied Mechanics Reviews and Engineering  
Information, Inc. Canadian Goods & Services  
Tax Registration #126148048.

# Journal of Dynamic Systems, Measurement, and Control

Published Quarterly by The American Society of Mechanical Engineers

VOLUME 120 • NUMBER 4 • DECEMBER 1998

## Technical Papers

- 429 Adaptive Control of Nonlinear, Uncertain Systems Using Local Function Estimation  
T.-J. Yeh and K. Youcef-Toumi
- 439 Modeling and Parameter Identification of Harmonic Drive Systems  
H. D. Taghirad and P. R. Bélanger
- 445 3 1/2 DOF Polynomial Solution of the Inferential  $H_2/H_\infty$  Control Problem With Application to Metal Rolling  
M. J. Grimble
- 456 Experimental and Theoretical Results in Output-Trajectory Redesign for Flexible Structures  
J. S. Dewey, K. Leang, and S. Devasia
- 462 Stability and Control of a Parametrically Excited Rotating Beam  
S. C. Sinha, Dan B. Marghitu, and Dan Boghiu
- 471 Modeling and Control of a Three-Dimensional Overhead Crane  
Ho-Hoon Lee
- 477 Applications of Adaptive Controllers to Systems With Nonlinear Parametrization  
A. M. Annaswamy, C. Thanomsat, N. Mehta, and Ai-Poh Loh
- 488 Robust, Digital, Nonlinear Control of Magnetic-Levitation Systems  
Scott A. Green and Kevin C. Craig
- 496 Modeling of Elastically Coupled Bodies: Part I—General Theory and Geometric Potential Function Method  
Ernest D. Fasse and Peter C. Breedveld
- 501 Modeling of Elastically Coupled Bodies: Part II—Exponential and Generalized Coordinate Methods  
Ernest D. Fasse and Peter C. Breedveld
- 507 Modeling and Control of the In-Situ Thermoplastic Composite Tape-Laying Process  
Wei-Ching Sun, Susan C. Mantell, and Kim A. Stelson

## Technical Briefs

- 516 Passivity-Based Interaction Controller and Observer for Robot Manipulators  
Bruno Siciliano and Luigi Villani
- 520 Robot Trajectory Control System Design for Multiple Simultaneous Specifications: Theory and Experimentation  
Hugh H. T. Liu and James K. Mills
- 524 A State and Parameter Identification Scheme for Linearly Parameterized Systems  
Chia-Shang Liu and Huei Peng
- 529 Position and Force Control of Two CRS A460 Robots Manipulating a Flexible Sheet: Theory and Experiment  
Dong Sun and James K. Mills
- 533 A Rugged and Reliable System for Measuring Engine Crankshaft Speed Fluctuations  
Hsi-Yung Feng

(Contents continued on Inside Back Cover)

This journal is printed on acid-free paper, which exceeds the ANSI Z39.48-1992 specification for permanence of paper and library materials. Ⓜ

♻️ 85% recycled content, including 10% post-consumer fibers.