ABCM SYMPOSIUM SERIES IN MECHATRONICS

Vol. 4

Editors
Victor Juliano De Negri
Eduardo André Perondi
Mauro André Barbosa Cunha
Oswaldo Horikawa

Published by ABCM – Brazilian Society of Mechanical Sciences and Engineering
Rio de Janeiro, RJ, Brazil
2010

ABCM SYMPOSIUM SERIES IN MECHATRONICS

Vol. 4

Editors

Victor Juliano De Negri
Eduardo André Perondi
Mauro André Barbosa Cunha
Oswaldo Horikawa

Published by ABCM – Brazilian Society of Mechanical Sciences and Engineering

Rio de Janeiro, RJ, Brazil
2010

Elaborado pela ABCM – Associação Brasileira de Engenharia e Ciências Mecânicas

De Negri, Victor Juliano 1960 – 

Mecatrônica/ Victor Juliano De Negri, Eduardo André Perondi, Mauro André Barbosa Cunha, Oswaldo Horikawa

Associação Brasileira de Engenharia e Ciências Mecânicas, 2010.

971p. : il.

I. Mecatrônica. 2. Automação e Controle

II. Título.


Copyright 2010 - Associação Brasileira de Engenharia e Ciências Mecânicas, ABCM.
Av. Rio Branco, 124/14º Andar Rio de Janeiro, RJ Brasil
Tel.: 55 21 22210438, www.abcm.org.br

A ABCM não autoriza a reprodução de qualquer parte desta publicação para sua distribuição em geral, para promoções, para a criação de novas publicações ou para a venda. Apenas através de prévia solicitação, por escrito, e em casos excepcionais, a ABCM poderá consentir a cópia de partes deste livro.

Documento preparado pelos editores em novembro de 2010.
Preface

The Mechatronics Symposium is the result of the Mechatronics Committee activities of the ABCM - Brazilian Society of Mechanical Science and Engineering. The fourth issue of the Symposium Series in Mechatronics includes 108 papers selected and presented at the Mechatronics Symposium of the 20th International Congress of Mechanical Engineering (COBEM 2009), held on November 15-20, 2009 in Gramado, RS, Brazil.

The purpose of the Mechatronics Symposium is to gather researchers in order to discuss, disseminate and share relevant results related to research and development activities in the area. The papers included in this volume were submitted to a reviewing and selection process in which they were judged by at least two referees nominated by members of the scientific committee.

About of 230 abstracts were initially submitted to the symposium including not only works from Brazilian research institutes but also from overseas institutes. These abstracts were preliminary evaluated and generate 163 papers that through a peer review process and 138 were considered adequate for presentation in the Mechatronics Symposium. Since COBEM-1999, when the first Mechatronics Symposium was organized, efforts were conducted so as to stimulate the submission of papers from abroad as well as invite a larger number of experts, giving the Symposium an increasing relevance in the international scenario. The positive evolution has been confirmed with the data from the Mechatronics Symposium in COBEM-1999, COBEM-2001, COBEM-2003, COBEM-2005, COBEM-2007, and COBEM-2009.

The review of the Mechatronics Symposium of COBEM2009 involved 187 researchers. The scope of the fourth issue of the Symposium Series in Mechatronics comprehends works in the following subjects (but not restricted to): precision mechanics, robotics, micro systems & MEMS, nano-technology, digital signal processing, signal analysis, sensors, actuators, control, discrete and hybrid systems, acoustics and vibration, applied computational mechanics, manufacturing automation, fluid power systems, computer integrated manufacturing, CAD/CAE/CAM/CAPP, automatic systems, computer vision.

The selected papers in this volume are grouped into 8 main subjects:

Section I - Computer Vision
Section II - Control Systems
Section III - Emerging Technologies and AI Applications
Section IV - Industrial Informatics, Discrete and Hybrid Systems
Section V - Intelligent and Distributed Manufacturing Systems
Section VI - Robotics
Section VII - Sensors & Actuators

We are grateful to the referees and the authors. We would like to thank also Eng. Luis Alberto Galaz Mamani and Mr. Paulo Leonel Teixeira for organizing the data and files used in this volume.
Editorial Committee

Victor Juliano De Negri - victor@emc.ufsc.br
Eduardo André Perondi – perondi@mecanica.ufrgs.br
Mauro André Barbosa Cunha - mauro@ifsul.edu.br
Oswaldo Horikawa - ohorikaw@usp.br

Contents

Section I - Computer Vision
Section II - Control Systems
Section III - Emerging Technologies and AI Applications
Section IV - Industrial Informatics, Discrete and Hybrid Systems
Section V - Intelligent and Distributed Manufacturing Systems
Section VI - Robotics
Section VII - Sensors & Actuators

Section I - COMPUTER VISION

I.01 APPLICATION OF COMPUTER VISION AND KALMAN FILTERING TECHNIQUES TO IDENTIFY OIL FLAMES NEBULIZATION QUALITY
A. T. Fleury, F. C. Trigo, F. P. R. Martins pp. 1 - 10

I.02 THREE-DIMENSIONAL SURFACE RECONSTRUCTION USING NURBS
Daniel Martins de Aquino, José Nilton Fonseca Junior, João Carlos Mendes Carvalho pp. 11 - 20

I.03 AN INTELLIGENT COMPUTER VISION SYSTEM TO ROCK CLASSIFICATION IN OIL AND GAS INDUSTRY
Laercio Brito Gonçalves, Fabiana Rodrigues Leta pp. 21 - 30

I.04 ROBOT POSITION ESTIMATION AND TRACKING USING SEQUENTIAL MONTE CARLO ALGORITHMS
Roberto Ferraz de Campos Filho, Newton Maruyama, Jun Okamoto Junior, Fabiano Rogerio Corrêa, Fabio Kawaoka Takase pp. 31 - 37

I.05 MULTIPLE 3D OBJECTS IDENTIFICATION FROM IMAGES BASED ON BOUNDING BOX RECONSTRUCTION
Marcelo Rudek, Osiris Canciglieri Jr, Paulo Roberto Gardel Kurka pp. 38 - 43
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Authors</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.06</td>
<td>3D SURFACE GENERATION FROM POINT CLOUDS ACQUIRED FROM A VISION-BASED LASER SCANNING SENSOR</td>
<td>Gerardo Antonio Idrobo Pizo, José Mauricio S. T. Motta</td>
<td>pp. 44 - 53</td>
</tr>
<tr>
<td>I.07</td>
<td>MODELING AN OPTICAL DIGITIZER ROBOTIC FOR READING THREE DIMENSIONAL OBJECTS</td>
<td>Jorge Eliécer Rangel Díaz, Werley Rochester Borges Ferreira, João Carlos Mendes Carvalho</td>
<td>pp. 54 - 61</td>
</tr>
<tr>
<td>II.01</td>
<td>ADAPTIVE CONTROL FOR AN ACTIVE SUSPENSION OF AN ELEVATOR</td>
<td>Santiago Miguel Rivas López, Eduardo André Perondi, Mário Roland Sobczyk Sobrinho</td>
<td>pp. 62 - 71</td>
</tr>
<tr>
<td>II.02</td>
<td>CONTROLLER TUNING USING MULTIOBJECTIVE PARTICLE SWARM OPTIMIZATION APPLIED TO A QUADRUPLE-TANK PROCESS</td>
<td>Helon Vicente Hultmann Ayala, Leandro dos Santos Coelho</td>
<td>pp. 72 - 79</td>
</tr>
<tr>
<td>II.03</td>
<td>CONTROL OF A TARGET TRACKING SYSTEM EMBEDDED IN A MOVING BODY</td>
<td>Maurício Gruzman, Hans Ingo Weber, Luciano Luporini Menegaldo</td>
<td>pp. 80 - 89</td>
</tr>
<tr>
<td>II.04</td>
<td>INFINITE-HORIZON PREDICTIVE CONTROL OF A HELICOPTER MODEL WITH THREE DEGREES OF FREEDOM</td>
<td>Rubens Junqueira Magalhães Afonso, Roberto Kawakami Harrop Galvão</td>
<td>pp. 90 - 99</td>
</tr>
<tr>
<td>II.05</td>
<td>COMPARATIVE ANALYSIS OF CONTROL STRATEGIES APPLIED ON SPEED CONTROL OF SERVOMOTOR USING PID AND FUZZY CONTROLLERS</td>
<td>Fábio Roberto Garcia de Lima, Wânderson de Oliveira Assis</td>
<td>pp. 100 - 109</td>
</tr>
<tr>
<td>II.06</td>
<td>DEFORMATION CONTROL OF A FLEXIBLE BEAM UNDER LOW FREQUENCY LOADING USING Ni-Ti-Cu SMA WIRE ACTUATOR</td>
<td>Walber Medeiros Lima, Carlos José de Araújo, Walter Andrés Vermehren Valenzuela, José Sérgio da Rocha Neto</td>
<td>pp. 110 - 119</td>
</tr>
<tr>
<td>II.07</td>
<td>ACTIVE CONTROL SYSTEM TO STABILIZE SUSPENDED MOVING VEHICLES IN CABLES</td>
<td>Danilo Martins Vieira, Ricardo Cury Ibrahim, Delson Torikai</td>
<td>pp. 120 - 126</td>
</tr>
<tr>
<td>Section</td>
<td>Title</td>
<td>Page Range</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------------------------------------------------------------------------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>II.08</td>
<td>COMPARATIVE ASSESSMENT OF PREDICTIVE CONTROLLERS FOR AN INVERTED PENDULUM WITH THREE CONFLICTING CONTROL OBJECTIVES</td>
<td>pp. 127 - 136</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adilson de Souza Cândido, Roberto Kawakami Harrop Galvão, Takashi Yoneyama</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.09</td>
<td>CONTROLLING OPERATING TEMPERATURE IN PEM FUEL CELLS</td>
<td>pp. 137 - 146</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Luis Alberto Martinez Riascos, David Dantas Pereira</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.10</td>
<td>ROBUST MODEL PREDICTIVE CONTROL FOR A MAGNETIC LEVITATION SYSTEM EMPLOYING LINEAR MATRIX INEQUALITIES</td>
<td>pp. 147 - 155</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mariana Santos Matos, Roberto Kawakami Harrop Galvão, Takashi Yoneyama</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.11</td>
<td>DIRECT SYNTHESIS FROM FREQUENCY RESPONSE MEASUREMENTS APPLIED TO THE CONTROLLER DESIGN OF A SERVO POSITIONING SYSTEM</td>
<td>pp. 156 - 162</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thiago Malta Buttini, Rodrigo Nicoletti</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.12</td>
<td>TESTBED FOR CONTROLLES OF LONGITUDINAL MOVEMENTS OF AIRCRAFT</td>
<td>pp. 163 - 169</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sérgio Ronaldo Barros dos Santos, Neusa Maria F. Oliveira</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.13</td>
<td>OPEN LOOP CONTROL OF FLEXIBLE BEAM PERIODIC MOTION VIA FREQUENCY RESPONSE ANALYSIS</td>
<td>pp. 170 - 178</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ivo Takao Futida, Rodrigo Nicoletti</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.14</td>
<td>AN IMPEDANCE CONTROL APPROACH FOR MACHINING TASKS USING ELASTIC JOINT MANIPULATORS</td>
<td>pp. 179 - 188</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Victor Barasuol, Edson De Pieri, Felipe Barreto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.15</td>
<td>APPLICATION OF TF/LTR ROBUST CONTROL TECHNIQUES TO FAILURE ACCOMMODATION</td>
<td>pp. 189 - 197</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mariana Santos Matos, Karl Heinz Kienitz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.16</td>
<td>MIXED H2/H* CONTROL OF A TWO-FLOORS BUILDING MODEL USING THE LINEAR MATRIX INEQUALITY APPROACH</td>
<td>pp. 198 - 207</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gustavo Luiz Chagas Manhães de Abreu, Vicente Lopes Jr., Michael J. Brennan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.17</td>
<td>GAIN-SCHEDULED L2 CONTROL OF DISCRETE-TIME POLYTOPIC TIME-VARYING SYSTEMS</td>
<td>pp. 208 - 217</td>
<td></td>
</tr>
<tr>
<td>II.18</td>
<td>A CONTINUOUS APPROXIMATION OF THE LUGRE FRICTION MODEL</td>
<td>pp. 218 - 228</td>
<td></td>
</tr>
</tbody>
</table>
II.19 A LEARNING CONTROL TECHNIQUE TO INCREASE THE FREQUENCY OF SERVO-HYDRAULIC TESTING MACHINES
Juan Gerardo Castillo Alva, Marco Antonio Meggiolaro, Jaime Tupiassu Pinho de Castro, Timothy H. Topper

II.20 NON-LINEAR FORCE CONTROL OF ACTUATORS BASED ON POLYMERIC ARTIFICIAL MUSCLES WITH CAPACITIVE EFFECT
Pedro Ferreira da Costa Blois de Assis, Marco Antonio Meggiolaro

II.21 ANALYSIS OF CONTROL LAWS FOR UNMANNED UNDERWATER VEHICLES
Samuel da Silva Gomes, Sebastião Cicero Pinheiro Gomes, Mário Lobo Centeno

Section III - EMERGING TECHNOLOGIES AND AI APPLICATIONS

III.01 FAULT DETECTION IN A 3DOF HELICOPTER SYSTEM
Elen Collaço de Oliveira, Guilherme Monteiro Garcia, Jackson Paul Matsuura, Roberto Kawakami Harrop Galvão

III.02 FINITE ELEMENT MODELING OF EDDY-CURRENT COUPLERS
Joaquim Girardello Detoni, Walter Jesus Paucar Casas

III.03 NONLINEAR IDENTIFICATION USING NEURAL NETWORK COMBINED WITH TRAINING BASED ON PARTICLE SWARM OPTIMIZATION
Fábio Alessandro Guerra, André Eugênio Lazzaretti, Leandro dos Santos Coelho, Cesar Augusto Tacla

III.04 GMDH ALGORITHM IMPLEMENTED IN THE INTELLIGENT IDENTIFICATION OF A BIOPROCESS
Francisco Herrera Fernández, Fidel Hernández Lozano

III.05 COMBINED APPROACH OF RBF NEURAL NETWORK, GENETIC ALGORITHM AND LOCAL SEARCH AND ITS APPLICATION IN IDENTIFICATION OF A NONLINEAR PROCESS
André Eugênio Lazzaretti, Fábio Alessandro Guerra, Rodrigo Jardim Riella, Hugo Vieira Neto, Leandro dos Santos Coelho

III.06 DESIGN AND IMPLEMENTATION OF A PILOT TEST FOR AN INDUSTRIAL PROTOTYPE OF HARMONIC DRIVE USING A FPGA REAL-TIME SYSTEM TO IMPLEMENTS CONTROL AND INSTRUMENTATION.
Javier Gamboa, Ernesto Córdoba, Juan Carlos Santamaría, Arturo Perpiñán

III.07 AN EXPERT SYSTEM FOR FAULT DIAGNOSTICS IN CONDITION BASED MAINTENANCE
Edgar Amaya Simeón, Alberto José Álvares, Ricardo Ribeiro Gudwin

pp. 304 - 313

III.08 IDENTIFICATION OF A POPPET VALVE USING GENETIC PROGRAMMING METHOD BASED ON ADAPTIVE PROBABILITIES WITH CHAOTIC TUNING AND ORTHOGONAL LEAST SQUARES
Leandro dos Santos Coelho, Carlos Eduardo Klein

pp. 314 - 324

III.09 REAL-TIME STRUCTURAL DAMAGE DETECTION USING PARITY RESIDUE ANALYSIS
Nilson Roberto Inocente-Junior, Euripedes Guilherme de Oliveira Nóbrega, Nazih Mechbal

pp. 325 - 334

Section IV - INDUSTRIAL INFORMATICS, DISCRETE AND HYBRID SYSTEMS

IV.01 AUTOMATIC ROUTING OF FORKLIFT ROBOTS IN WAREHOUSE APPLICATIONS
Kelen C. Teixeira Vivaldini, Marcelo Becker, Glauco A. P. Caurin

pp. 335 - 344

IV.02 HYBRID APPROACH TO AIR CONDITIONING SYSTEMS MODELLING USING PETRI NET
Antonio Gabriel S. Almeida, Emília Villani, Fabrício Junqueira, Paulo E. Miyagi

pp. 345 - 354

IV.03 AN EDUCATIONAL FRAMEWORK FOR REMOTE CONTROL OF A PUMA ROBOT
Carlos Cesar Aparecido Eguti, Carlos Eduardo Oliveira da Silva, Emil Yoshigae Nakao, Emília Villani, Luís Gonzaga Trabasso

pp. 355 - 363

IV.04 PETRI NETS AND GRAPHIC SIMULATION FOR THE VALIDATION OF COLLABORATIVE ROBOTIC CELLS IN AIRCRAFT INDUSTRY
Adriano José Cunha de Aguiar, Emília Villani, Fabrício Junqueira

pp. 364 - 373

IV.05 MODEL-BASED REFINEMENT OF REQUIREMENT SPECIFICATION: A COMPARISON OF TWO V&V APPROACHES
Rodrigo Pastl Pontes, Marcelo Essado, Paulo Claudino Véras, Ana Maria Ambrósio, Emília Villani

pp. 374 - 383

IV.06 USING SIMULATION TOOLS IN THE DEVELOPMENT OF A NETWORKED CONTROL SYSTEMS RESEARCH PLATFORM
Eduardo Paciência Godoy, Arthur José Vieira Porto, Ricardo Yassushi Inamasu

pp. 384 - 393
IV.07 MODEL PREDICTIVE CONTROL WITH CONSTRAINTS ON ACCUMULATED DEGRADATION OF ACTUATORS
Eduardo Bento Pereira, Roberto Kawakami Harrop Galvão, Takashi Yoneyama

IV.08 CHANNEL/INSTANCE PETRI NETS FOR STRUCTURAL AND FUNCTIONAL MODELING OF INDUSTRIAL EQUIPMENT
Henri Carlo Belan, Víctor Juliano De Negri, Rodrigo Szpak

IV.09 A SYSTEMATIZED APPROACH TO OBTAIN DEPENDABLE CONTROLLERS SPECIFICATIONS
José Machado, Eurico Seabra

IV.10 FORMAL SYNTHESIS SIMULATION AND AUTOMATIC CODE GENERATION OF SUPERVISING CONTROL FOR A MANUFACTURING CELL
Yuri Garcia Silva, Max Hering de Queiroz

IV.11 DEVELOPMENT OF CONTROL CABINET FOR INDUSTRIAL ROBOTS UP TO SIX DEGREES OF FREEDOM
Jordano Fernandes Cordeiro, Kássio Maciel Kienitz, Marcelo Henrique Souza Bomfim, Paulo José Alves Souza, Frederico Allevato Ramalho Filho, Eduardo José Lima II, Alexandre Queiroz Bracarense

IV.12 MODELING OF AN ELEVATOR GROUP CONTROL SYSTEM USING PROGRAMMABLE LOGIC CONTROL AND DESTINATION CONTROL SYSTEM
Alvaro A. Patiño-Forero, Daniel M. Muñoz, Guilherme Caribé de Carvalho, Carlos H. Llanos

IV.13 A HOLONIC APPROACH TO THE INTEGRATION OF AUTOMATED SYSTEMS
José Reinaldo Silva, Marco Antonio Poli Jr., Celina Soares Pereira, José Mendes Machado

IV.14 INTRODUCING OBJECT-ORIENTATION IN UNIFIED PETRI NET APPROACH
Jose Reinaldo Silva, José Armando San Pedro Miralles, Arianna Olivera Salmon, Pedro M. Gonzalez del Foyo

IV.15 IMPLEMENTATION AND EVALUATION OF A CAN-BASED DISTRIBUTED CONTROL SYSTEM FOR VARIABLE RATE TECHNOLOGY IN AGRICULTURAL MACHINERY
Robson Rogério Dutra Pereira, Eduardo Paciência Godoy, Rodrigo Martins Romeira Sakai, Arthur José Vieira Porto, Ricardo Yassushi Inamasu
IV.16 ENERGY SAVING IN BUILDING AUTOMATION USING ZIGBEE WIRELESS NETWORK AND FUZZY CONTROL
Paulo A. F. Júnior, Adolfo Bauchspiess
pp. 470 - 479

IV.17 AUTOMATIC TRAFFIC CONTROL STRATEGY FOR SINGLE TRACK RAILWAYS IMPLEMENTED IN SEQUENTIAL FLOW CHART ON AN INDUSTRIAL PROGRAMMABLE CONTROLLER
Tiago Romeiro de Jesus, José Adriany Victor de Aquino, Guilherme Caribé de Carvalho, Carlos Humberto Llanos Quintero
pp. 480 - 489

IV.18 AN OPEN CONTROL SYSTEM FOR MANIPULATOR ROBOTS
Diego Caberlon Santini, Walter Fetter Lages
pp. 490 - 498

Section V - INTELLIGENT AND DISTRIBUTED MANUFACTURING SYSTEMS

V.01 A REAL-TIME SIMULATOR FOR AUV DEVELOPMENT
João Lucas Dozzi Dantas, Ettore Apolonio de Barros
pp. 499 - 508

V.02 TRAJECTORIES AND SIMULATION MODEL OF AGVs WITH TRAILERS
Omar Lengerke, Abrahão Campos Moutinho Vieira, Max Suell Dutra, Fernando de Noronha Castro Pinto, Felipe Maia Galvão França
pp. 509 - 518

V.03 4-D MODELING APPLIED TO INDUSTRIAL AUTOMATION
Ivando S. Diniz, Diego Colón, Fernando P. Marafão
pp. 519 - 527

V.04 FRAMEWORK FOR COLLABORATIVE MANUFACTURING SYSTEMS BASED IN SERVICES
José Isidro Garcia Melo, Caio César Fattori, Fabrício Junqueira, Paulo Eigi Miyagi
pp. 528 - 537

V.05 AUTONOMOUS LOCAL CONTROL AND REMOTE MANAGEMENT: ALTERNATIVE FOR CRITICAL INDUSTRIAL AUTOMATED SYSTEMS
Luciana de Almeida Pacheco, Herman Augusto Lepikson
pp. 538 - 545

V.06 PARAMETER IDENTIFICATION OF A FEED DRIVE FOR HIGH SPEED MACHINE TOOLS
Agustín Casquero, Rogelio Hecker, Diego Vicente, Marcelo Flores
pp. 546 - 552

V.07 DIRECT ACCESS OF CNC DATA FOR VIBRATION CONTROL
Carlos Eduardo Oliveira da Silva, Emília Villani, Jefferson de Oliveira Gomes
pp. 553 - 558
V.08 FEASIBILITY STUDY OF NON CONVENTIONAL PARAMETERS FOR DISTURBANCES MONITORING AND DETECTING IN SHORT CIRCUIT GAS METAL ARC WELDING

Eber Huanca Cayo, Sadek C. Absi Alfaro

Section VI - ROBOTICS

VI.01 PROPOSAL FOR A NEW DESIGN FOR CONTINUUM ROBOTS SUITABLE TO MANIPULATE TOOLS IN HIGHER POSITIONS

Vitor Finotto Cores, Oswaldo Horikawa, Andre Riyuiti Hirakawa

pp. 559 - 569

VI.02 LOAD BALANCER WITH AUTOMATIC LIFTING FORCE COMPENSATION

Rogério Yamamoto, André Hirakawa, Oswaldo Horikawa

pp. 570 - 579

VI.03 A GENERAL APPROACH FOR ACCURACY ANALYSIS OF PARALLEL MANIPULATOR WITH JOINT CLEARANCE

Rogério Sales Gonçalves, João Carlos Mendes Carvalho

pp. 580 - 589

VI.04 A MULTI-OBJECTIVE OPTIMIZATION DESIGN FOR PARALLEL STRUCTURES

Rogério Sales Gonçalves, João Carlos Mendes Carvalho, Rogério Rodrigues dos Santos

pp. 590 - 598

VI.05 A NEW APPROACH FOR COLLISION AVOIDANCE OF MANIPULATORS OPERATING IN UNSTRUCTURED AND TIME-VARYING ENVIRONMENTS

Carlos Rodrigues Rocha, Henrique Simas, Daniel Martins, Altamir Dias

pp. 599 - 608

VI.06 USE OF THE GROBNER BASIS IN THE STUDY OF MANIPULATORS TOPOLOGY

Giovana Trindade da Silva Oliveira

pp. 609 - 617

VI.07 A PERPENDICULARITY MEASUREMENT SYSTEM FOR INDUSTRIAL ROBOTS

Luís Fernando Ferreira Furtado, Emilia Villani, Ricardo Sutério

pp. 618 - 627

VI.08 A STUDY OF THREE CONTROL APPROACHES FOR THE CYCLIST ROBOT PROBLEM

Yesid Enrique Castro Caicedo, Carlos Humberto Llanos Quintero, Walter de Britto Vidal Filho, Leandro dos Santos Coelho

pp. 628 - 637

VI.09 COMPARISON BETWEEN LOOK-AND-MOVE AND VISUAL SERVO CONTROL USING SIFT TRANSFORMS IN EYE-IN-HAND MANIPULATOR SYSTEM

pp. 638 - 647

pp. 648 - 657
Ilana Nigri, Marco Antonio Meggiolaro, Raul Queiroz Feitosa

VI.10 A STUDY ON HEXAPOD ROBOTS AND MODELING BY MEANS OF CAD TECHNIQUES
Thiago Augusto Ferreira, Armando Carlos de Pina Filho, Alexandre Silva de Lima pp. 658 - 665

VI.11 TRAJECTORIES GENERATION USING ARTIFICIAL NEURAL NETWORKS
Luiz Eduardo Nicolini do Patrocínio Nunes, Valesca Alves Correa, José Rui Camargo, Carlos Alberto Chaves pp. 666 - 672

VI.12 GAIN SCHEDULING CONTROL FOR THE HYDRAULIC ACTUATION OF THE HYQ ROBOT LEG
Thiago Boaventura Cunha, Claudio Semini, Emanuele Guglielmino, Victor Juliano De Negri, Yousheng Yang, Darwin G. Caldwell pp. 673 - 682

VI.13 MODEL CHECKING A ROV REACTIVE CONTROL ARCHITECTURE
Fábio Henrique de Assis, Newton Maruyama, Fabio Kawaoka Takase pp. 683 - 692

VI.14 DEVELOPMENT OF PARALLEL ROBOTS FOR WELDING
Emanuel Barbosa Silva, Frederico Allevato Ramalho Filho, Eduardo José Lima II, Alexandre Queiroz Bracarense, Hernandes Coutinho Fagundes pp. 693 - 699

VI.15 A SPECIALIZED WELDING ROBOT FOR REPAIRING HYDRAULIC TURBINE BLADES
José Mauricio S. T. Motta, Guilherme Caribé de Carvalho, Carlos Humberto Llanos Quintero, Walter de Britto Vidal Filho, Enio Prates Vasconcelos Filho, Luciano Selva Ginani pp. 700 - 709

VI.16 TRAJECTORY PLANNING WITH REDUNDANT COOPERATIVE ROBOTICS SYSTEMS
Cristiane Pescador Tonetto pp. 710 - 718

VI.17 KINEMATIC MODEL FOR ECLIPSE AND ECLIPSE-II PARALLEL ROBOT
Henrique Simas, Altamir Dias, Daniel Martins pp. 719 - 728

VI.18 SCREW-BASED RELATIVE JACOBIAN FOR MANIPULATORS COOPERATING IN A TASK USING ASSUR VIRTUAL CHAINS
Luiz Ribeiro, Daniel Martins pp. 729 - 738

VI.19 KINEMATIC CONCEPTION OF A HYDRAULIC ROBOT APPLIED TO POWER LINE INSULATORS MAINTENANCE
pp. 739 - 748
VI.20 DEVELOPMENT OF A HYBRID ARCHITECTURE FOR THE AUTONOMOUS CONTROL OF MOBILE ROBOTS  
Hugo Silva, Alberto Álvares  
pp. 749 - 757

VI.21 MOBILE ROBOT LOCALIZATION IN OUTDOOR ENVIRONMENTS USING COMPLEMENTARY FILTERING  
Douglas Guimarães Macharet, Armando Alves Neto, Víctor Costa da Silva Campos, Mario Fernando Montenegro Campos  
pp. 758 - 767

VI.22 MACHINE VISION AND ARTIFICIAL NEURAL NETWORKS FOR SEAM TRACKING AND WELD INSPECTION  
Fernando de Aguiar Faria, Abraão Marques Tavares, Marina Spyer Las Casas, Frederico Allevato Ramalho Filho, Eduardo José Lima II, Alexandre Queiroz Bracarense  
pp. 768 - 775

Section VII - SENSORS & ACTUATORS

VII.01 STUDY OF THE ELETROCHEMICAL COMPORTAMENT (PLATINUM / POLYANILINE / PALLADIUM) MODIFIED ELECTRODE FOR DEVELOPING HYDROGEN SENSOR PERMEATE IN METTALIC STRUCTURES APPLIED IN OIL REFINARIES.  
Lilian Machado Moya, Jéferson Aparecido Moreto, Haroldo de Araújo Ponte, Carlos Marcus Gomes da Silva Cruz  
pp. 776 - 783

VII.02 DEVICE FOR MEASURING THE PAINTING THICKNESS AND CIRCUNFERENCIAL DEFORMATION ON 14" PIPELINES  
Vitor Ferreira Romano, Cesar Gomes Ferreira, Luiz Eduardo da Silva Demenicis, Ney Robinson Salvi dos Reis  
pp. 784 - 792

VII.03 SHORT PULSE CHARACTERIZATION OF NONLINEARITIES IN POWER ULTRASOUND TRANSDUCERS  
Nicolás Pérez Alvarez, Nilson Noris Franceschetti, Flávio Buiochi, Julio Cezar Adamowski  
pp. 793 - 801

VII.04 THEORETICAL AND EXPERIMENTAL STUDY OF THE PRESSURE BEHAVIOR ON HYDRAULIC POSITIONING SYSTEMS  
Rodrigo Szpak, José Roberto Branco Ramos Filho, Henri Carlo Belan, Victor Juliano de egri  
pp. 802 - 811
VII.05 STUDY OF NOVEL GEOMETRIES FOR OSCILLATORY BIMORPH ACTUATOR OF A PIEZOELECTRIC FLOW PUMP  
Cícero R. de Lima, Adriano A. Koga, Márcio B. Falcão, Sandro L. Vatanabe, Andres Choi, Emílio C. Nelli Silva  
pp. 812 - 817

VII.06 NONLINEAR CHARACTERISTICS SYSTEMATIC STUDY IN PNEUMATIC ACTUATORS  
Carla Silvane Ritter, Antonio Carlos Valdiero, Pedro Luís Andrighetto, Fernando Zago, Luciano Endler  
pp. 818 - 826

VII.07 PERISTALTIC PUMP USING SOLENOID TYPE ACTUATOR  
Diogo Cao Pires, Angeline R. Santos, Marc Lucas H. Neilson, Oswaldo Horikawa  
pp. 827 - 834

VII.08 STUDY OF THE BOUNDARY ELEMENT METHOD FOR THE DIRECT PROBLEM OF ELECTRICAL IMPEDANCE TOMOGRAPHY  
Vanessa Rolnik, Olavo H. Menin, Grazieli L. C. Carosio, Paulo Seleghim Junior  
pp. 835 - 843

VII.09 MECHATRONIC SERVO SYSTEM APPLIED TO A SIMULATED-BASED AUTOThROTTLE MODULE  
Rafael Coronel Bueno Sampaio, Marcelo Becker  
pp. 844 - 853

VII.10 ON-LINE TRAJECTORY ADAPTATION FOR ACTIVE LOWER LIMBS ORTHOSES BASED ON NEURAL NETWORKS  
Marciel A. Gomes, Adriano A. G. Siqueira  
pp. 854 - 863

VII.11 MAGNETIC SUSPENSION OF THE ROTOR OF A VENTRICULAR ASSISTANCE DEVICE OF MIXED FLOW TYPE – HALL SENSOR FOR ROTOR POSITION SENSORING  
Pedro Antunes, Orlando de Mello, Eduardo Bock, Aron Andrade, Isaias da Silva, Oswaldo Horikawa  
pp. 864 - 873

VII.12 A LOW COST PIEZOELECTRIC VALVE-LESS DIAPHRAGM PUMP  
Andres Choi, Sandro L. Vatanabe, Cícero R. de Lima, Emílio C. Nelli Silva  
pp. 874 - 881

VII.13 ON LINE FAULT DETECTION FOR SERVOPROPORTIONAL VALVES  
José Roberto Branco Ramos Filho, Victor Juliano De Negri  
pp. 882 - 891

VII.14 EVALUATION OF A MODE CONVERSION DUAL-CELL TO MEASURE THE COMPLEX REFLECTION COEFFICIENT AT A SOLID-LIQUID INTERFACE  
Ediguer E. Franco, Julio C. Adamowski, Flávio Buiochi  
pp. 892 - 897
| VII.15 | ANALYSIS OF THE INFLUENCE OF TEMPERATURE ON THE FRICTION COEFFICIENT OF FRICTION MATERIALS | pp. 898 - 906 |
| Jean Greselle Balotin, Patric Daniel Neis, Ney Francisco Ferreira |

| VII.16 | RELATION BETWEEN THE TEMPERATURE OF THE DISC MEASURED WITH THERMOCOUPLE AND BY THERMOGRAPHY USING A REDUCED SCALE DYNAMOMETER | pp. 907 - 913 |
| Patric Daniel Neis, Gabriel Aquino Schell Kruze, Ney Francisco Ferreira |

| VII.17 | STATIC MODELING OF MCKIBBEN PNEUMATIC MUSCLE | pp. 914 - 922 |
| Giovanno Ferrari Zuglian, Lúcio Corrêa, Giovani Geremia, Miguel Ignácio Serrano, Eduardo André Perondi |

| VII.18 | ANALYSIS OF THE DISCRETE REPRESENTATION METHOD TO COMPUTE ECHO RESPONSES FROM CIRCULAR CONCAVITY DEFECT | pp. 923 - 933 |
| Paulo Orestes Formigoni, Orlando Cirullo Filho, Julio C. Adamowski, Flávio Buiochi |

| VII.19 | DEVELOPMENT OF A DIDACTIC EQUIPMENT FOR PNEUMATIC COMPONENT SIZING | pp. 934 - 943 |
| Yesid Ernesto Asaff Mendoza, Mauro Damian Hené, Thiago Boaventura Cunha, Victor Juliano De Negri |

| VII.20 | ON THE PERFORMANCE OF LINEAR AND ROTARY SERVO MOTORS IN SUB MICROMETRIC ACCURACY POSITIONING SYSTEMS | pp. 944 - 951 |
| Gilva Altair Rossi de Jesus, José Maria Galvez, Carlos Alberto Martin |

| VII.21 | DYNAMICAL MODELING AND CONTROL DESIGN OF A FLEXIBLE RADAR ANTENNA | pp. 952 - 961 |
| Agenor de Toledo Fleury, Fabrizio Leonardi, Fabiano Armellini |

| VII.22 | ANALYSIS AND EXPERIMENTAL REALIZATION OF A HYBRID ELECTRO-VISCOELASTIC VIBRATION NEUTRALIZER | pp. 962 - 971 |
| Rodrigo Féder Paraná, Carlos Alberto Bavastri |