



Citation for published version:

Johnston, DN & Plummer, AR (eds) 2012, *Fluid Power and Motion Control: FPMC 2012*. Centre for Power Transmission and Motion Control.

Publication date:
2012

[Link to publication](#)

University of Bath

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Contents

Preface iv

Pumps and motors

A novel approach to predict the cylinder block / valve plate interface performance in swash plate type axial piston machines 13

Marco Zecchi, Prof.Dr.-Ing. Monika Ivantysynova

Optimal Design of Gears and Lateral Bushes of External Gear Machines 29

Ram Sudarsan Devendran, Andrea Vacca

Friction measurement of plunger bushing contact in fuel injection pumps 51

Sebastian Drumm, Stefan Heitzig, Hubertus Murrenhoff

Geometric Features of Gerotor Pumps Analytic vs Cad Methods 59

Gianluca Carconi, Cristian D'Arcano, Nicola Nervegna, Massimo Rundo

Efficient Fluid Power

Thermal Insulation in Enhancing Performance Characteristics of Hydraulic Accumulator 81

J. Juhala, J. Kajaste, M. Pietola

Energy-efficient electrohydraulic compact drives for low power applications 93

Dipl.-Ing. Sebastian Michel, Professor Dr.-Ing. Jürgen Weber

Optimizing Hydraulic Energy Recovery System of Reach Truck 109

H. Hänninen, J. Kajaste, M. Pietola

Minimizing the Power Dissipation in the Piston-Cylinder Gap Using a Barrel-Shaped Piston 123

Kim A. Stelson, Feng Wang

Digital Hydraulics

- Digital Hydraulic Pressure Relief Function 137
M. Ketonen, M. Huova, M. Heikkilä, M. Linjama, P. Boström, M. Waldén
- Analysis of Dynamic Properties of a Fast Switching On-Off Valve for Digital Displacement Pumps 151
Daniel B. Rømer, Per Johansen, Henrik C. Pedersen, Torben O. Andersen
- Active control of pressure pulsation in a switched inertance hydraulic system using a rectangular-wave reference signal 165
Min Pan, Nigel Johnston, Andrew Hillis

Control I

- A Sliding Mode Controller Based on the Interacting Multiple Model Strategy 181
M. A. El Sayed, S. A. Gadsden, S. R. Habibi
- Hydraulic servoactuator for adaptive force control of fast trains pantographs 195
Davide Ferrara, Giovanni Jacazio, Andrea Mornacchi, Stefano Pastorelli, Massimo Sorli
- Issues of sensor noise, bandwidth and sampling time in PID pressure control 213
Matthias Liermann
- Overshoot and steady-state error of hydraulic press driven by DCV-positioned pump-controlled asymmetric cylinder 227
Jianfeng Tao, Haiyan Yang, Guofang Gong, Chengliang Liu

Pneumatics I

- A Pneumatic Position Servo Based on On/Off Valve Actuated Muscle Actuators in Opposing Pair Configuration 243
Ville Jouppila, Asko Ellman
- Implementation and Analysis of a Pneumatic Pipe Model 259
Jan Elvers, Hubertus Murrenhoff
- Investigation on the Efficiency of Pneumatic System Using Air Power 271
Toshiharu Kagawa, Maolin Cai, Xin Li
- Sliding Mode Control of an MRI-Compatible Pneumatically Actuated Robot 283
David B. Comber, Diana Cardona, Robert J. Webster, III, Eric J. Barth

Control II

- A Combined Multiple Inner Loop Control Strategy for an Electro-Hydraulic Actuator 297
Mohammed A. El Sayed, Saeid Habibi
- The Fractional Order PID Control of Hydraulic Position System Based on Internet 321
Shi Guanglin, Wang Ruigang, Xu Zhenyin
- Deterministic Control Strategy for a Hybrid Hydraulic System with Intermediate Pressure Line 333
*Dipl.-Ing. Peter Dengler, Prof. Dr.-Ing. Marcus Geimer,
Dipl.-Ing. René von Dombrowski*
- Proportional control system design and probability of stability for a pilot operated proportional valve with parametric uncertainty 347
Richard Carpenter, Roger Fales

Control and Modelling

- Optimizing Dynamic Properties of Hydraulic Actuator for Hardware-in-the- Loop Damper Testing 365
T. Saarikoski, J. Kajaste, M. Pietola
- Dynamic Modelling of a Linear Friction Welding Machine actuation system 379
D.T. Williams, P. Wilson, A. R. Plummer
- Multivariable Backstepping Controls of a High Bandwidth Electro-hydraulic Actuator 397
Yaozhong Xu, Lilia Sidhom, Eric Bideaux, Mohamed Smaoui
- Analysis of Two Typical Thrust Electro-hydraulic Control Systems for Shield Tunneling Machine 411
Weiqliang Wu, Guofang Gong, Hu Shi

Modelling and Simulation

- System Modelling and Bulk Modulus Estimation of an Electrohydrostatic Actuator 423
Y. Song, S. A. Gadsden, S. A. El Delbari, S. R. Habibi
- Modeling of a Proportional Valve by MCMC Method 439
Junhong Liu, Huapeng Wu, Heikki Handroos, Heikki Haario
- Steady and Unsteady Flow Force acting on a Spool Valve 451
Kazuhiro Tanaka, Keitaro Kamata, Kouki Tomioka, Takeshi Yamaguchi
- Effective Bulk Modulus Model Verification for the Mixture of Air/Gas and Oil 467
H.Gholizadeh, D. Bitner, R.Burton, G.Schoenau

Automotive and Aerospace Application

- Optimal Sizing of Pipe Networks in Aircraft Hydraulic System Preliminary Design 489
C. Dunker, F. Thielecke, T. Homann
- Coupling Displacement Controlled Actuation with Power Split Transmissions in Hydraulic Hybrid Systems for Off-Highway Vehicles 505
Michael Sprengel, Dr. Monika Ivantysynova
- Fault-tolerant steer-by-wire valve for agricultural tractors based on independent metering with on/off valves 519
Dipl.-Ing. David Schmitz, Prof. Dr.-Ing. Marcus Geimer
- Generation of power transmission architectures for redundant actuators 537
Amine Fraj, Jean-Charles Mare, Marc Budinger

Renewable Energy

- Design and Control of Full Scale Wave Energy Simulator System 551
*Henrik C. Pedersen, Anders H. Hansen, Rico H. Hansen I,
Torben O. Andersen, Michael M. Bech*
- Determining Required Valve Performance for Discrete Control of PTO
Cylinders for Wave Energy 565
Rico H. Hansen, Torben O. Andersen and Henrik C. Pedersen
- Wind turbines with variable hydraulic transmissions and electrically
excited synchronous generators directly connected to the grid 579
Peter Chapple, Michael Niss, Knud Erik Thomsen

Pneumatics II

- Design of a Figure-Eight free-liquid-piston engine compressor for compact
robot power 595
Mark E Hofacker, Mengze Sun, Eric J Barth
- Test rig and Simulation Software for Performance Comparison of Pneumatic
Servo Controllers Given three Actuator Setups and five Circuit Configurations
of Control Valve 609
Ramhuzaini Abd. Rahman, Nariman Sepehri
- Development of a Low Noise Pressure Reducing Valve for High Pressure
Hydrogen Using a Radial Slit Structure 623
Chongho Youn, Yoshinari Nakamura, Toshiharu Kagawa