

**Proceedings of
BATH/ASME 2022 Symposium on
Fluid Power and Motion Control

(FPMC2022)**

**September 14-16, 2022
Bath, United Kingdom**

Conference Sponsor
Fluid Power Systems and
Technology Division

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Two Park Avenue * New York, N.Y. 10016

© 2022, The American Society of Mechanical Engineers, 2 Park Avenue, New York, NY 10016, USA
(www.asme.org)

All rights reserved. Printed in the United States of America. Except as permitted under the United States Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written permission of the publisher.

INFORMATION CONTAINED IN THIS WORK HAS BEEN OBTAINED BY THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS FROM SOURCES BELIEVED TO BE RELIABLE. HOWEVER, NEITHER ASME NOR ITS AUTHORS OR EDITORS GUARANTEE THE ACCURACY OR COMPLETENESS OF ANY INFORMATION PUBLISHED IN THIS WORK. NEITHER ASME NOR ITS AUTHORS AND EDITORS SHALL BE RESPONSIBLE FOR ANY ERRORS, OMISSIONS, OR DAMAGES ARISING OUT OF THE USE OF THIS INFORMATION. THE WORK IS PUBLISHED WITH THE UNDERSTANDING THAT ASME AND ITS AUTHORS AND EDITORS ARE SUPPLYING INFORMATION BUT ARE NOT ATTEMPTING TO RENDER ENGINEERING OR OTHER PROFESSIONAL SERVICES. IF SUCH ENGINEERING OR PROFESSIONAL SERVICES ARE REQUIRED, THE ASSISTANCE OF AN APPROPRIATE PROFESSIONAL SHOULD BE SOUGHT.

ASME shall not be responsible for statements or opinions advanced in papers or . . . printed in its publications (B7.1.3). Statement from the Bylaws.

For authorization to photocopy material for internal or personal use under those circumstances not falling within the fair use provisions of the Copyright Act, contact the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923, tel: 978-750-8400, www.copyright.com.

Requests for special permission or bulk reproduction should be addressed to the ASME Publishing Department, or submitted online at: <https://www.asme.org/publications-submissions/journals/information-for-authors/journalguidelines/rights-and-permissions>

ISBN: 978-0-7918-8633-5

CONTENTS

Proceedings of BATH/ASME 2022 Symposium on Fluid Power and Motion Control

FPMC2022-87665	V001T01A001
Energetic Investigation of Common Pilot Operation and the Energy Saving Potential of Electromechanical Valve Actuators <i>Tobias Vonderbank and Katharina Schmitz</i>	
FPMC2022-88101	V001T01A002
Modeling Fluid Inertia Effects in External Gear Machines Through Lumped Parameter Approach <i>Zubin Mistry, Andrea Vacca, Sujan Dhar, and Manuel Rigosi</i>	
FPMC2022-88249	V001T01A003
Research on Life Extension of Water Hydraulic Control Valve Based on Augmented Reality for Fault Diagnosis <i>He Xu and Feng Sun</i>	
FPMC2022-88469	V001T01A004
Gerotor Pump Simulation Modules for Enhancing Fluid Power Education <i>Israa Azzam, Sujan Dhar, Veeranagouda Patil, Dipak Maiti, Paul Asunda, Jose Garcia Bravo, and Farid Breidi</i>	
FPMC2022-88503	V001T01A005
Analysis of a Digital Pump With Variable Speed Drive <i>Samuel Kärnell and Liselott Ericson</i>	
FPMC2022-88563	V001T01A006
Advancements in the Control Strategy for Digital Hydraulically Driven Knee Exoskeleton <i>Rituraj Rituraj and Rudolf Scheidl</i>	
FPMC2022-88601	V001T01A007
A Digital Hydraulic Load-Sensing System Based on Hydraulic Free Piston Engine <i>Feng Wang, Jiaming Wu, Bing Xu, and Zongxuan Sun</i>	
FPMC2022-88614	V001T01A008
The Use of Additive Manufactured Plastic in Small-Scale Poppet Valves and Pressure Vessels <i>Brendan Deibert, Sophia Scott, Allan Dolovich, and Travis Wiens</i>	
FPMC2022-88646	V001T01A009
Fault Detection and Diagnosis for a Hydraulic Press by Use of a Mixed Domain Database <i>Faried Makansi and Katharina Schmitz</i>	
FPMC2022-88893	V001T01A010
A Cylinder Enabling Algorithm for Reduction in Low Frequency Pulsation From Digital Displacement Pumps <i>Daniil Dumnov and Niall Caldwell</i>	
FPMC2022-88957	V001T01A011
A Hydraulically Controlled Multiple Buck Converter System <i>Rudolf Scheidl, Philipp Zagar, and Helmut Kogler</i>	

FPMC2022-88959	V001T01A012
Practical Evaluation of a Control Concept for a Remote Controlled 1.8T Excavator Using a 3D Input Device <i>Christian Haas, Arne Schneider, Andreas Opgenoorth, and Katharina Schmitz</i>	
FPMC2022-88967	V001T01A013
Experimental Validation of Extremum Seeking Control for a Midsized Hydrostatic Transmission Wind Turbine <i>Daniel Escobar-Naranjo, Biswaranjan Mohanty, and Kim A. Stelson</i>	
FPMC2022-89002	V001T01A014
Dynamometer Testing of Hydraulic Fluids in an Axial Piston Pump Under Simulated Backhoe Loader Trenching Conditions <i>Paul Michael, Kim Stelson, Daniel Williams, and Hassan Malik</i>	
FPMC2022-89019	V001T01A015
A Deep Koopman-Based Model Predictive Control Method for Valve-Controlled Hydraulic Cylinder Systems <i>Heng Liu, Wei Sun, Hao Sun, Jianfeng Tao, and Chengliang Liu</i>	
FPMC2022-89042	V001T01A016
Active Pressure Pulsation Suppression Method by Parallel-Series Structure in DFCU Based on Variable Step Size FXLMS Algorithm <i>Jing Yao, Yuwang Cheng, Pei Wang, Juntao Zhao, and Yupeng Wang</i>	
FPMC2022-89072	V001T01A017
Fuzzy-Based Adaptive Model Predictive Control for Deteriorating Model Uncertainty of Hydraulic Servo Systems <i>Hao Sun, Jianfeng Tao, Honggan Yu, and Chengliang Liu</i>	
FPMC2022-89083	V001T01A018
Prognostics in Custom-Build Electro-Hydraulic Variable-Speed Drive Applications <i>Terkil Bak-Jensen and Lasse Schmidt</i>	
FPMC2022-89099	V001T01A019
Improving Wheel Loader Energy Efficiency With a Series Electric Hybrid Powertrain <i>Zichang Lin, Feng Wang, and Bing Xu</i>	
FPMC2022-89105	V001T01A020
The Connection Between Sliding Mode Analysis and Singular Perturbation Theory for Modeling Fast Hydraulically Fed-Back Switching Valves <i>Philipp Zagar and Rudolf Scheidl</i>	
FPMC2022-89107	V001T01A021
Autofrettage and Its Impact on High-Cycle Fatigue of Hydraulic Components <i>Andris Rambaks, Niklas Bauer, Paul Knipper, and Katharina Schmitz</i>	
FPMC2022-89252	V001T01A022
Investigation of Temperature Influence on Flow Mapping of Electrohydraulic Valves and Corresponding Application <i>Jianbin Liu, André Sitte, and Jürgen Weber</i>	
FPMC2022-89359	V001T01A023
Fault Diagnosis of Control Valve Based on Fusion of Deep Learning and Elastic Weight Consolidation <i>Hao Yin, He Xu, Yuhua Zhao, and Feng Sun</i>	

FPMC2022-89366	V001T01A024
Control of Multi-Pressure Hydraulic Supply Line Using Digital Hydraulic Power Management System	
<i>Mikko Huova and Matti Linjama</i>	
FPMC2022-89380	V001T01A025
In-Situ Lubrication Film Thickness Measurements in a Radial Piston Motor Using Adaptive Ultrasound Reflectometry	
<i>Elias Vagn Hansen, Jens Rendbæk, Lasse Almind Jensen, and Per Johansen</i>	
FPMC2022-89509	V001T01A026
Control Strategy of Adjustable Pilot Counterbalance Valves for Efficient Hydraulic Actuation	
<i>Annalisa Sciancalepore, Andrea Vacca, and Steven Weber</i>	
FPMC2022-89547	V001T01A027
Perspectives on Component Downsizing in Electro-Hydraulic Variable-Speed Drive Networks	
<i>Lasse Schmidt, Søren Ketelsen, and Kenneth Vorbøl Hansen</i>	
FPMC2022-89548	V001T01A028
State Decoupling & Stability Considerations in Electro-Hydraulic Variable-Speed Drive Networks	
<i>Lasse Schmidt, Søren Ketelsen, and Kenneth Vorbøl Hansen</i>	
FPMC2022-89553	V001T01A029
Incorporating a Rotatable Valve Cam to Improve the Efficiency of a Hydraulic Motor in an Inline Hydro-Mechanical Transmission (i-HMT)	
<i>Evan D. Sand and Perry Y. Li</i>	
FPMC2022-89567	V001T01A030
Research on High Precision Control of Maximum Power Point Tracking for Offshore Hydraulic Wind Turbine	
<i>Jiarui Zhang, Wenting Chen, Chao Ai, Yue Yang, Shuming Shang, and Qin Zhou</i>	
FPMC2022-89636	V001T01A031
Fluid-Structure Optimization of Small-Scale Hydraulic Conduits	
<i>Jeffrey J. Bies and William Durfee</i>	
FPMC2022-89646	V001T01A032
Design and Modeling of Heave Compensation System Based on Secondary Regulation Technology	
<i>Jingfu Wang, Tianbao Zhu, Zhiyong Su, Haodi Tang, and Xu Zang</i>	
FPMC2022-89650	V001T01A033
Optimizing Viscosity for Maximum Power in a Hydrostatic Transmission Wind Turbine	
<i>Justin Chen, Biswaranjan Mohanty, Daniel Escobar-Naranjo, and Kim A. Stelson</i>	
FPMC2022-89718	V001T01A034
Flux Weakening Operation Based Design of an Integrated Electrohydraulic Axial Piston Unit	
<i>Shanmukh Sarode, Lizhi Shang, Andrea Vacca, and Scott D. Sudhoff</i>	
FPMC2022-89721	V001T01A035
An Experimental Study on High-Flowrate Ultrasonic Particle Monitoring in Oil Hydraulics	
<i>Per Johansen, Michael M. Bech, Sune Dupont, Uffe N. Christiansen, Jens L. Sørensen, David N. Østedgaard-Munck, and Anders Bentien</i>	

FPMC2022-89847	V001T01A036
An Improved Elastic and Non-Contact Smart Sealing Concept for Digital Micro Hydraulic Valves	
<i>Matthias Scherrer and Rudolf Scheidl</i>	
FPMC2022-89855	V001T01A037
Sensor Placement in a Hydraulic Drive System	
<i>Gudrun Mikota, Rudolf Scheidl, and Rainer Haas</i>	
FPMC2022-89900	V001T01A038
A Novel Hydraulic Solution to Simulate Inertial Forces on a Landing Gear Qualification Test Rig	
<i>Andrea De Martin, Giovanni Jacazio, Andrea Ruffinatto, and Massimo Sorli</i>	
FPMC2022-89927	V001T01A039
Active Damping of a Hydrostatic Steering Circuit for an Articulated Vehicle	
<i>Emil Nørregård Olesen, Torben Ole Andersen, and Poul Ennemark</i>	
FPMC2022-89984	V001T01A040
A Multimodal Climbing-Swimming Soft Robotic Lamprey	
<i>James Gallentine, Eric J. Barth, Kevin Galloway, Brian Van Stratum, Jonathan Clark, and Kourosh Shoele</i>	
FPMC2022-89985	V001T01A041
Design and Analysis of a Digital Hydrostatic Transmission for Wind Turbines	
<i>Lucas Zanatta Manosso and Victor J. De Negri</i>	
FPMC2022-90090	V001T01A042
Design and Simulation Analysis of a Pump-Controlled Actuation System for Heavy-Duty Booms	
<i>Xu Han, Manu Leinonen, and Tatiana Minav</i>	
FPMC2022-90184	V001T01A043
Accumulator Sizing for the Hybrid Hydraulic Electric Architecture (HHEA) Using Dynamic Programming	
<i>Jackson Wills and Perry Y. Li</i>	
FPMC2022-90185	V001T01A044
A Set of Benchmark Problems for Fluid Power System Simulation	
<i>Bernhard Manhartsgruber</i>	
FPMC2022-90575	V001T01A045
High Precision Nonlinear Motion Control of a Hydraulic Orbital Motor-Driven Linear Rack	
<i>Bobo Helian, Sebastian Beiser, and Marcus Geimer</i>	
FPMC2022-90598	V001T01A046
State-of-the-art of Variable Displacement Technologies for Radial Piston Hydraulic Machines	
<i>Justin Darnet and Éric Bideaux</i>	
FPMC2022-90715	V001T01A047
An Electric-Hydraulic Hybrid Wheel Loader With Mode-Driven Control Strategy	
<i>Zihan Wu, Feng Wang, Bing Xu, and Wieslaw Fiebig</i>	
FPMC2022-90897	V001T01A048
Investigation of a New Orbital Steering Concept With Focus on the Control Loop Performance	
<i>Emil Nørregård Olesen and Torben Ole Andersen</i>	