

ASME FPMC 2023

ASME/BATH Symposium
on Fluid Power and Motion Control

Program

CONFERENCE
October 16 – 18, 2023

Lido Beach Resort
Sarasota, FL

<https://event.asme.org/FPMC>



ASME FPMC 2023

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ASME FPMC 2023

Welcome

Dear Symposium Participants,

Welcome to the 2023 ASME/Bath Symposium on Fluid Power and Motion Control (FPMC 2023) hosted at the Lido Beach Resort, nestled on the captivating shores of Sarasota, Florida. It is our pleasure to extend a warm greeting as we come together to explore the latest advancements in fluid power systems and technology and foster invaluable connections within the international fluid power community.

This year's symposium, a collaborative effort between the American Society of Mechanical Engineers (ASME) and the University of Bath, continues the tradition of excellence that began in 2009, with alternating locations between Bath (UK) and various destinations in the USA so far. Our goal is to provide a stimulating platform for academics and industry experts, to discuss cutting-edge developments and challenges in advancing the fluid power and motion control areas.

The heart of the symposium certainly lies within its technical program. We received an overwhelming 93 full paper submissions, and after a rigorous review process, we have assembled a final program of 79 outstanding papers. These papers will be presented across multiple sessions, thoughtfully scheduled over the course of the three days.

The centerpiece of the FPMC 2023 symposium will be the prestigious Koski Lecture, a highlight of every FPMC gathering. This year, we have the honor of hosting Dr. Perry Li of University of Minnesota, the recipient of the 2023 Koski Medal, who will share his groundbreaking research in fluid power. Additionally, the final day of the symposium will feature a panel session with representatives from fluid power companies.

Beyond the technical sessions, the symposium also includes a series of social events. On the opening evening, we are invited to Sun Hydraulics for a BBQ gathering. The following evening, we have the Koski Banquet, where we will formally award the ASME Robert Koski Medal to this year's recipient, Dr. Perry Li. Moreover, the additional networking opportunities during lunches and coffee breaks allow you to forge valuable connections with peers and industry professionals.

We wish to extend our appreciation to members of the Organizing and International Committees, session chairs, reviewers, and all the dedicated ASME staff who have worked tirelessly behind the scenes to make the FPMC 2023 symposium a resounding success. We are deeply grateful to our group of sponsors for their generous contributions. Please take a moment to recognize their significant support on the sponsor acknowledgment page.

As Co-Chairs of FPMC 2023, we are confident that this symposium will be a stimulating and enriching experience for each one of you. We hope this event will not only expand your knowledge, but also leave you with memories of the splendor of this beachside location.

Once again, a warm welcome to FPMC 2023! Thank you for being an integral part of this gathering. Enjoy the symposium, and may the days ahead be filled with inspiration and fruitful interactions.

Sincerely,

Dr. Nariman Sepehri and Dr. Lizhi Shang
Symposium Co-Chairs, FPMC 2023

REGISTRATION

Registration will be located each day in the Royal Ballroom Foyer located on the 8th floor.

The hours are as follows:

Sunday, October 15 3:00PM – 6:00PM
Monday, October 16 7:00AM – 3:00PM
Tuesday, October 17 7:00AM – 5:00PM
Wednesday, October 18 7:00AM – 5:00PM

ACKNOWLEDGMENT

The ASME/Bath Fluids Symposium on Motion Control is sponsored by the FPST Division of the American Society of Mechanical Engineers. In particular, registration fees for ASME students have been subsidized by the division.

HOTEL

Surrounded by powdery white sands and the turquoise waters of the Gulf of Mexico, Lido Beach Resort welcomes travelers to a private, beachfront paradise along Sarasota's Lido Key.

Lido Beach Resort

700 Benjamin Franklin Drive
Sarasota, FL 34236
Phone Number: 941-388-2161

NAME BADGES REQUIRED

Please always wear your name badge for all functions. Admission to all conference functions will be by name badge. Your badge also provides a helpful introduction to other attendees.

AUDIOVISUAL EQUIPMENT IN SESSION ROOMS

The technical session room will be equipped with one LCD projector and one screen. Laptops will NOT be provided in the sessions. Presenters should bring their own or arrange in advance with session chairs.

TICKETED FUNCTIONS

Entrance to all social functions is included with your registration and allowable by wearing your conference badge. If you have purchased an additional ticket for the Koski Awards Banquet on Tuesday, October 17, for your spouse and/or guests, you will receive a ticket for the banquet when you check in at registration.

TAX DEDUCTIBILITY

The expense of attending a professional meeting, such as registration fees and costs of technical publications, are tax deductible as ordinary and necessary business expenses for U.S. citizens. However, recent changes in the tax code have affected the level of deductibility.

INTERNET ACCESS

Complimentary basic internet is provided in the sleeping rooms, if you are staying at the Lido Beach Resort, and in the hotel's public space and meeting space provided by ASME; use LidoBeach Guest. For access in the meeting space, you can access the internet using one of the options below. No password is required:

DRIFT Kitchen and Bar, LidoBeach Guest, 8th Floor Conference

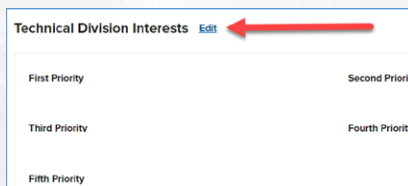
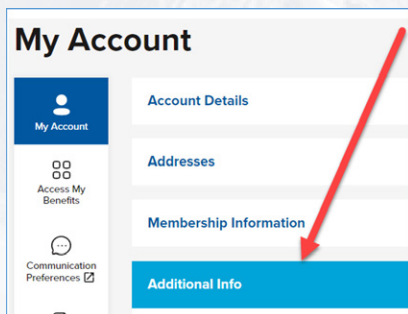
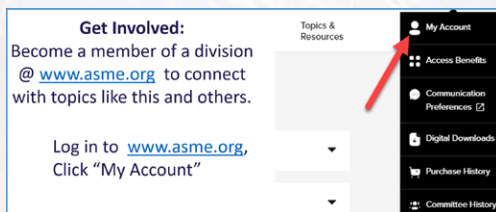
DRIFT and 8th Floor would be the best to connect to while on the 8th floor as that is where their servers are located for both.

MEMBERSHIP TO ASME (4 Months Free!)

New registrants who paid the non-member conference registration fees will receive a four-month complimentary ASME Membership. ASME will automatically activate this complimentary membership for qualified attendees. Please allow approximately four weeks after the conclusion of the conference for your membership to become active. Visit www.asme.org/membership for more information about the benefits of ASME Membership.

How to Become a Member of the ASME FPST Division

1. www.asme.org
2. Click on **“MY ACCOUNT”**
3. Click on **“Additional Info”**
4. Click on **“Edit”** on “Technical Division Interests”.
5. Select your division interests.
6. **SAVE** your selections.



Please ensure that you have granted permission to receive communications from FPST.

1. Login to asme.org and click on Communication Preferences.
2. Click “Login to Preference Center”.
3. Under ASME Sections and Technical Division Communications, Opt-In to division communications by checking the box next to Technical Divisions.
4. Check all your Preferences to be sure you receive the information from ASME that you are interested in.
5. Click “Save Preferences”.

PRESENTER ATTENDANCE POLICY

According to ASME’s Presenter Attendance Policy, if a paper is not presented at the conference, the paper will not be published in the official Archival Proceedings, which are registered with the Library of Congress and are abstracted and indexed. The paper also will not be published in the ASME Digital Collection and may not be cited as a published paper.

EMERGENCY INFORMATION

If you are experiencing a health emergency, please dial 911. If you are able or someone else is able, please dial zero and inform the operator so that the hotel can be on the alert for the emergency response team. The hotel also has 24-hour security and officers trained in first aid, CPR, & AED service.

CONFERENCE EVENT CONNECT APP

FPMC 2023 will be utilizing the ASME Events mobile app to enhance the experience for attendees and speakers in place of a printed program. Connect with Attendees, View Speaker Profiles, Access Session Information and more! Options may vary by event.

CONFERENCE PROCEEDINGS

Each attendee will receive an email during/after the conference with an individual link for online access to all of the papers accepted for presentation at the conference. In the event you do not receive the email, send a request to toolboxhelp@asme.org. The official conference archival proceedings will be published after the conference and will not include accepted papers that were not presented at the conference. The official conference proceedings are registered with the Library of Congress and submitted for abstracting and indexing. The proceedings are published on the ASME Digital Library.

REGISTRANTS WITH DISABILITIES

Whenever possible, we are pleased to plan for handicapped registrants. Advance notice may be required for certain requests. For on-site assistance, please visit the registration area and ask to speak with a conference representative.

HAVE QUESTIONS ABOUT THE MEETING?

If you have any questions or need assistance, an ASME representative will be located at the registration desk.

CONFERENCE EVENTS

BREAKFAST

Monday, October 16 – Wednesday, October 18, 7:00AM – 8:00AM
Drift Lounge and Restaurant, 8th Floor

Starting with Monday morning prior to the start of the technical sessions, a continental breakfast will be provided. All registered conference attendees are welcome! Immediately following breakfast will be the daily technical presentations starting at 8:00AM. See the section of this program for more details as well as information about our presentations.

COFFEE BREAKS

Monday October 16,
10:00AM – 10:30AM

Tuesday, October 17,
10:00AM – 10:30AM
and 2:30PM – 3:00PM

Wednesday, October 18,
10:00AM – 10:30AM
and 2:50PM – 3:10PM
Royal Ballroom Foyer, 8th Floor

LUNCHES

Monday, October 16 and Tuesday, October 17,
12:30PM – 1:30PM

Wednesday, October 18,
12:30PM – 1:20PM
Drift Lounge and Restaurant, 8th Floor

KOSKI AWARD BANQUET

Tuesday, September 12
6:30PM – 9:00PM
Royal Palm Ballroom, 8th Floor

Join us on Tuesday from 6:30PM to 9:00PM in the Royal Palm Ballroom for a reception and gala banquet dinner where we will honor and present the Robert E. Koski Medal, which recognizes individuals who have advanced the art and practice of fluid power motion and control through education and/or innovation, to Dr. Perry Li.

EXHIBITS

Monday, October 16

10:00AM – 3:00PM

Tuesday, October 17 and Wednesday, October 18

10:00AM – 4:00PM

Royal Ballroom Foyer, 8th Floor

Please take advantage of the opportunity to visit our exhibitors from some of the leading industries in the field. They are making things happen, so be sure to stop by and meet them! Their experts will be on hand to speak with you, so please remember to stop by. Our Sponsors/Exhibitors help support the conference, so let us support them!

Sun Hydraulics Tour and BBQ

Monday, October 16

4:00 PM – 7:00 PM

Buses will depart at 4:00 PM Sharp!

A guided tour of two of Sun Hydraulics state of the art manufacturing facilities on its Tallevast Road campus on the evening of October 16th followed by a catered BBQ dinner from Brick's Smoked Meats with refreshments. Free transportation from the parking lot adjacent to the Lido Beach Resort will leave promptly at 4 o'clock. For those that wish to drive themselves, the address is:

803 Tallevast Road
Sarasota 34243

(please use designated parking spaces).

The tours will be in small groups and guided to see the assembly and testing of Sun's cartridge valves (803 Tallevast) and the CNC machining, heat treat, and finish machining (701 Tallevast). Through your tour you will see the state of the art manufacturing utilizing automated, semi-automated, and manual processes in machining, finish machining, assembly, and testing of products.

The catered BBQ dinner will follow in the employee lunchroom and patio at 803 Tallevast.

Proper attire is required. No open toe shoes, sandals, or shorts are permitted. Safety glasses and hearing protection will be provided.

Return transportation to the Lido Beach Resort will depart at approximately 7 o'clock.

SunHydraulics.com

TIME	EVENT	ROOM
MONDAY, OCTOBER 16		
07:00AM–08:00AM	Breakfast	Drift Lounge and Restaurant
08:00AM–08:20AM	Welcome and Opening Remarks - Nariman Sepehri	Royal Palm Ballroom
08:20AM–10:00AM	1 - Digital Hydraulics	Cypress Room
10:00AM–10:30AM	Coffee Break	Royal Palm Ballroom Foyer
10:30AM–12:30PM	2A - Controls 1	Banyan Room
	2B - Pumps 1	Cypress Room
12:30PM–01:30PM	Lunch	Drift Lounge and Restaurant
01:30PM–02:50PM	3A - Controls 2	Banyan Room
	3B - Pumps 2	Cypress Room
04:00PM–07:00PM	Sun Hydraulics Tour & BBQ	Off-site - Buses depart at 4:00 PM Sharp
TUESDAY, OCTOBER 17		
07:00AM–08:00AM	Breakfast	Drift Lounge and Restaurant
08:00AM–10:00AM	4 - Transmissions/Work Circuits 1	Banyan Room
10:00AM–10:30AM	Coffee Break	Royal Palm Ballroom Foyer
10:30AM–12:30PM	5A - Controls 3	Banyan Room
	5B - Hydraulic Fluids, Materials, Rheology, and Tribology	Cypress Room
12:30PM–01:30PM	Lunch	Drift Lounge and Restaurant
01:30PM–02:30PM	Robert E. Koski Lecture	Banyan Room
02:30PM–03:00PM	Coffee Break	Royal Palm Ballroom Foyer
03:00PM–05:00PM	6A - Transmissions/Work Circuits 2	Cypress Room
	6B - Fault Analysis and Diagnosis	Banyan Room
06:30PM–09:00PM	Koski Award Banquet	Royal Palm Ballroom
WEDNESDAY, OCTOBER 18		
07:00AM–08:00AM	Breakfast	Drift Lounge and Restaurant
08:00AM–10:00AM	7 - Fluid Power Components	Banyan Room
10:00AM–10:30AM	Coffee Break	Royal Palm Ballroom Foyer
10:30AM–12:30PM	8A - Modeling and Simulation	Banyan Room
10:30AM–12:30PM	8B - Valves	Cypress Room
12:30PM–01:20PM	Lunch	Drift Lounge and Restaurant
01:20PM–02:50PM	Industry Panel	Banyan Room
02:50PM–03:10PM	Coffee Break	Royal Palm Ballroom Foyer
03:10PM–04:50PM	9 - Pumps 3	Banyan Room
04:50PM–05:00PM	Closing Remarks	Royal Palm Ballroom
05:00PM	Conference Ends	

Established in 2007, the Robert E. Koski Medal recognizes individuals who have advanced the art and practice of fluid power motion and control through education and/or innovation.

The Medal was established by the Fluid Power Systems and Technology Division to honor Robert E. Koski's contributions to the field of Design Engineering and Dynamic Systems and Control.



PAST ROBERT E. KOSKI MEDAL RECIPIENTS

2007	Wolfgang Backe
2008	Clifford R. Burrows
2009	Jan Ove Palmberg
2010	Yongxiang Lu
2011	Richard T. Burton
2012	Siegfried Helduser
2013	Wayne J. Book
2014	Hubertus J. Murrenhoff
2015	Monika Ivantysynova
2016	Kim Stelson
2017	Werner Dieter
2018	Luca G. Zarotti
2019	Peter A.J. Achten
2020	Shinichi Yokota
2021	Huayong Yang
2022	Rudolf Scheidl

2023 Robert E. Koski Medal Awardee:

Professor Perry Y. Li, *University of Minnesota*



Perry Y. Li received his B.A. (Hons) / M.A. in Electrical and Information Sciences from Cambridge University in 1987, his M.S. in Biomedical Engineering from Boston University in 1990, and his Ph.D. in Mechanical Engineering from the University of California, Berkeley in 1995. Between 1995 and 1997, he was on the Research Staff at the Xerox Wilson Research Center in Webster, NY, working on control of paper paths and color printing. He joined the Mechanical Engineering Department at the University of Minnesota as the Nelson Assistant Professor in 1997. He was promoted to Professor in 2008. Between 2006 and 2014, he was the Founding Deputy Director for the NSF-funded Center for Compact and Efficient Fluid Power (CCEFP) with the responsibility of coordinating the center's research across the different institutions. He was the General Chair for the 2021

ASME/Bath Symposium on Fluid Power and Motion Control and is currently the Vice-Chair of the ASME FPST Division. At the University of Minnesota, he teaches system dynamics, control, and fluid power at both the undergraduate and graduate levels. His research focuses on the design, modeling, sensing, and control of mechanical and fluid power systems. Topics include safe human-robot interaction, renewable energy storage using compressed air, efficient and controllable fluid power components, on/off valve-based control, hybrid and electrified power trains for on-road and off-road vehicles, and wave energy. He holds 7 patents and has published over 250 papers in journals and peer-reviewed conferences. He is a Fellow of the ASME and a Senior Member of IEEE.

Wednesday, October 18
1:20PM – 2:50PM
Banyan Room

Moderator: *Kim Stelson*

Continuing the history of the ASME/Bath Fluid Power and Motion Control Symposium (FPMC), a panel session is organized to provide the FPMC 2023 attendees the point of view of industry on aspects related to R&D and market trends of fluid power.

In the first part of the panel, the invited speakers will provide their view on selected topics. The following part of the panel session will promote an open discussion, through a Q&A time that will also involve the audience.



Kim Stelson
University of Minnesota

Kim Stelson is the Founding Director of the NSF Engineering Research Center for Compact and Efficient Fluid Power. He is College of Science and Engineering Distinguished Professor in the Department of Mechanical Engineering at the University of Minnesota where he has been since 1981. His research includes work on improving the efficiency of off-road vehicles and wind turbines. He has received the Rudolf Kalman Best Paper Award from ASME twice, is a Fellow of the AAAS and ASME, and has received the Koski and Bramah Medals.

Invited Speakers



Dr. Peter Achten
INNAs BV

Peter Achten studied mechanical engineering at Eindhoven University of Technology, where he also received his PhD in 1996. In 1987 he started INNAs (Innovation Associates) as a privately owned engineering and development company. In 2008, Peter received the Joseph Bramah Medal awarded by the Mechatronics, Informatics & Control Group of the Institution of Mechanical Engineers, and in 2019 the Robert E. Koski Medal, awarded by the American Society of Mechanical Engineers. In 2021 he was inducted by the International Fluid Power Society into the Fluid Power Hall of Fame. Peter is the owner and CEO of INNAs.

Title: *Five Simple Questions?*



Dr. Enrique Busquets
Bosch Rexroth North America

Enrique Busquets has been the engineering director with regional product and business development responsibility on electronics, software, telematics, and electrification at Bosch Rexroth North America since April 2021. Additionally, Enrique has been responsible for the testing and validation infrastructure in North America since 2018 and innovations since 2016. Enrique holds a bachelor's degree from the University of Texas at El Paso and a master's and doctorate degree in mechanical engineering from Purdue University with emphasis on hydraulics and electronics controls. In addition to his professional activities, Dr. Enrique Busquets is the Bosch Rexroth industry sponsor and representative at the Maha research center and the National Fluid Power association.

Title: The Role of Digitalization in Off-Highway Equipment



Gary Kassen
Case New Holland (CHN) Industrial

Gary Kassen is the Engineering Director for Hydraulics and Pneumatics at CNH Industrial based in Burr Ridge, IL. He has global responsibility for hydraulic and pneumatic systems in agriculture and construction equipment.

Prior to CNH, Mr. Kassen worked in product development and fluid power research at Sundstrand Aerospace and Eaton Corporation. Mr. Kassen holds a BS in Mechanical Engineering. He has been actively involved in the leadership of the Center for Compact and Efficient Fluid Power and the Savvy Engineering Group for over 10 years.

Title: Off-Road SBTi Initiatives and the Importance of Hydraulic Evolution



Céline Cabana
FD-GROUPS America

Céline Cabana is Director of FD-GROUPS America. She received her mechanical engineering degree from Sherbrooke University, Canada, and her Masters in industrial engineering from Bordeaux I University, France. She has a diversified experience both in consulting and manufacturing in the global market place. She is now in charge of growing the US market for FD-GROUPS America and is based in Marietta, Georgia, just outside Atlanta. FD-GROUPS America is the North American subsidiary of the French-based FLUIDESIGN Group with expertise in hydraulics, electronics and dynamic simulation.

Title: Innovative Simulation Approach for Developing Emerging Technologies



Chris Williamson
Danfoss Power Solution

Chris Williamson is an employee of Danfoss Power Solutions in Ames, Iowa, USA. He manages a small team of engineers working on systems and applications of Digital Displacement® Pumps. Chris holds a Ph.D. degree from Purdue University and has more than 10 years of experience with manufacturing firms in fluid power components and off-highway vehicles. Energy-efficient hydraulic systems are a recurring theme in his work experience, patents and scholarly publications.

Title: CO2 Reduction for Real: A Few Examples

October 16, 2023

Session 1 – Digital Hydraulics 8:20AM – 10:00AM - Cypress Room

Chair: *Bernhard Manhartgruber - Johannes Kepler University*
Co-chair: *Nigel Johnston – University of Bath*

- 1. Efficiency of a Digital Displacement Pump Operating With Partial Strokes**
Technical Paper Publication: 111388
Daniil Dumnov - Danfoss Scotland
Jérémie Lagarde - Danfoss Scotland
- 2. Design and Experimental Investigation of an Additively Manufactured High-Speed Switching Valve**
Technical Paper Publication: 111694
Lukas Matias - University of Bath, Domin Fluid Power Limited
Min Pan - University of Bath
Andrew Plummer - University of Bath
- 3. A Digital Hydraulic Full-Bridge Oscillation Transformer**
Technical Paper Publication: 111865
Per Johansen - Aalborg University
Anders Hedegaard Hansen - Aalborg University
- 4. Digital Displacement Motoring Characteristics of Dynamic Energy Recovery and Hydraulic Transformation**
Technical Paper Publication: 111913
Vojtech Pavlis - Danfoss Scotland Inc.
Colin McMillan - Danfoss Scotland Inc.
Christian Nørgård - Danfoss Scotland Ltd.
Niall James Caldwell - Danfoss Scotland Ltd.
- 5. An Analysis of a Digital Electro Hydrostatic Actuator for Application in Aircraft Flight Control Systems**
Technical Paper Publication: 111940
Marcos Paulo Nostrani - Federal University of Santa Catarina
Dimitri Oliveira E Silva - Federal University of Santa Catarina
Rodrigo Simões Lopes Junior - Federal University of Santa Catarina
Vinícius Vigolo - Federal University of Santa Catarina
Petter Krus - Linköping University
Victor Juliano De Negri - Federal University of Santa Catarina

Session 2A: Controls 1 10:30AM – 12:30PM - Banyan Room

Chair: *Saeid Habibi - McMaster University*

- 1. Impact of Motion Simultaneity in Determination of Design Load Cycles for an Electro-Hydraulic Variable-Speed Drive Network**
Technical Paper Publication: 109823
Mikkel van Binsbergen-Galàn - Aalborg University
Lasse Schmidt - Aalborg University
- 2. A Feedforward Energy-Saving Control Method for IMVC Hydraulic Cylinder Systems Using the Deep Koopman Operator**
Technical Paper Publication: 111276
Heng Liu - Shanghai Jiao Tong University
Jianfeng Tao - Shanghai Jiao Tong University
Wei Sun - Shanghai Jiao Tong University
Qi Wei - Shanghai Jiao Tong University
Chengliang Liu - Shanghai Jiao Tong University
- 3. Projection Method for Hydraulic Piston Motor Torque Control**
Technical Paper Publication: 111492
Justin Darnet - Ampère (UMR5005), Université Lyon
Eric Bideaux - Ampère (UMR5005), Université Lyon
Jean-François Trégouët - Ampère (UMR5005), Université Lyon
- 4. Disturbance Observer-Based Nonlinear Motion Control of the Parallel Platform for Wave Compensation**
Technical Paper Publication: 111741
TianZhu Wang - Zhejiang University
Jianhua Wei - Zhejiang University
Qiang Zhang - Hangzhou Doubltech Electro-Hydraulic Engineering Co., Ltd.
Jinhui Fang - Zhejiang University

5. Bandwidth Expansion and Resonant Suppression for High-Frequency Electro-Hydraulic Acceleration Control System by Combining Dynamic Pressure Feedback and Three-Variable Control

Technical Paper Publication: 111744
Guifu Luo - Zhejiang University
Tingming Yang - Zhejiang University
Ziyang Mu - Zhejiang University
Jun Zou - Zhejiang University
Hua Zhou - Zhejiang University
Huayong Yang - Zhejiang University

6. Adaptive Sliding Mode Control Based on the Immersion and Invariance Principle for the Accurate Spool Control of Proportional Servo Valve

Technical Paper Publication: 111998
Zhi Qiu - Zhejiang University
Junhui Zhang - Zhejiang University
Qi Su - Zhejiang University
Haibin Li - Zhejiang University
Bing Xu - Zhejiang University
Jiasheng Wang - Zhejiang University

Session 2B: Pumps 1

10:30AM – 12:30PM - Cypress Room

Chair: *James D. Van de Ven - University of Minnesota*

Co-Chair: *Kim Stelson - University of Minnesota*

1. Modelling of Pumps and Motors as Source Flow Ripple and Source Impedance

Technical Paper Publication: 110716
Nigel Johnston - University of Bath
Daniil Dumnov - Danfoss Scotland Ltd.
Jonathan Melling - Danfoss Scotland Ltd.

2. Counteracting Centrifugal Forces on the Cups in a Floating Cup Pump

Technical Paper Publication: 111127
Sef Achten - Innas B.V.
Robin Mommers - Innas B.V.
Jasper Achten - Innas B.V.
Jeroen Potma - Innas B.V.
Peter Achten - Innas B.V.

3. The Transition of Wear and Leakage Characteristics of the Cylinder Block/Valve Plate Interface in a Wide Range of Operating Conditions

Technical Paper Publication: 111370
Xuguang Li - State Key Laboratory of Fluid Power and Mechatronic Systems
Junhui Zhang - State Key Laboratory of Fluid Power and Mechatronic Systems
Fei Lyu - State Key Laboratory of Fluid Power and Mechatronic Systems
Bing Xu - State Key Laboratory of Fluid Power and Mechatronic Systems

4. Comparison of Airborne Sound Quality Between Digital Displacement and Traditional Axial Piston Pumps

Technical Paper Publication: 111507
Jonathan Melling - Danfoss Scotland
Nigel Johnston - University of Bath

5. Numerical Study of an Axial Piston Pump: The Effect of Different External Loads on Pressure Ripples

Technical Paper Publication: 111737
Chang Dong - Shanghai Jiaotong University
Jianfeng Tao - Shanghai Jiaotong University
Hao Sun - Shanghai Jiaotong University
Chengliang Liu - Shanghai Jiaotong University

6. Flow Ripple Minimization in a Triplex Pump Through the Implementation of Various Linkage Mechanisms

Technical Paper Publication: 111788
Martin S. Herrera Perez - University of Minnesota
Kristen Morse - University of Minnesota
Md. Minal Nahin - University of Minnesota
James D. Van de Ven - University of Minnesota

Session 3A: Controls 2

1:30PM – 2:50PM - Banyan Room

Chair – *Jürgen Weber - Technische Universität Dresden*

Co-Chair: *Andrew Plummer – University of Bath*

- 1. Control of Hydraulic Injection Moulding Machine With Electro-Hydraulic Variable-Speed Drive**
Technical Paper Publication: 111497
Rasmus A. Hertz - LEGO System A/S
Ole Therkelsen - LEGO System A/S
Søren Kristiansen - LEGO System A/S
Jesper K. Christensen - LEGO System A/S
Frederik A. Hansson - Aalborg University
Lasse Schmidt - Aalborg University
- 2. Precision Motion Control of an Independent Metering System With an Adaptive Piecewise Polynomial Valve Model**
Technical Paper Publication: 111576
Chen Li - Zhejiang University
Peishuai Yan - East China Jiaotong University
Ruqi Ding - East China Jiaotong University
Litong Lyu - Shijiazhuang Tiedao University
Bobo Helian - Karlsruhe Institute of Technology
Zheng Chen - Zhejiang University
Bin Yao - Purdue University
- 3. Human-in-the-Loop Motion Control of a Two-DOF Hydraulic Backhoe Powered by the Hybrid Hydraulic Electric Architecture (HHEA)**
Technical Paper Publication: 111819
Arpan Chatterjee - University of Minnesota
Perry Y. Li - University of Minnesota
- 4. Online Dynamic Model Correction for Hydraulic Manipulator Grasped Unknown Payload**
Technical Paper Publication: 111833
Sheng Zheng - Zhejiang University
Zhiwei Chen - Zhejiang University
Junhui Zhang - Zhejiang University
Ruqi Ding - East China Jiaotong University
Bing Xu - Zhejiang University
Fu Zhang - Zhejiang University

Session 3B: Pumps 2

1:30PM – 2:50PM - Cypress Room

Chair: *Peter Achten - Innas*

Co-Chair: *Travis Wiens – University of Saskatchewan*

- 1. Prediction of Housing Wear-in in External Gear Machine Considering Deformation Effects**
Technical Paper Publication: 111670
Ajinkya Pawar – Purdue University
Andrea Vacca – Purdue University
Manuel Rigosi – Casappa S.p.A.
- 2. External Gear Pumps Performance With Graphene Oxide Hydraulic Fluid**
Technical Paper Publication: 111687
Ornella Chiavola – Roma TRE University
Fulvio Palmieri – Roma TRE University
Andrea Liscio – CNR – Consiglio Nazionale delle Ricerche
Simone Ligi – Graphene-XT 40011
- 3. Combined Pump and Compensator Margin Control for Pre Compensated Load Sensing Architecture: Implementation and Experiments**
Technical Paper Publication: 113450
Patrick Stump – CNH Industrial
Xin Tian – CNH Industrial
Jacob Lengacher – Purdue University
Ryan Jenkins – CNH Industrial
Andrea Vacca – Purdue University
Stefano Fiorati – CNH Industrial America
- 4. Experimental Investigation of an Innovative High-Speed External Gear Pump Prototype for Advanced Electro-Hydraulic Actuated Automotive Transmissions**
Technical Paper Publication: 111899
Fabrizio Paltrinieri – University of Modena and Reggio Emilia
Massimo Milani – University of Modena and Reggio Emilia
Luca Montorsi – University of Modena and Reggio Emilia

October 17, 2023

Session 4: Transmissions/Work Circuits 1

8:00AM – 10:00AM – Banyan Room

Chair: *Heikki Handroos – Lappeenranta University*

Co-Chair: *Nariman Sepehri – University of Manitoba*

1. An Analysis of a Multi-Pump System for Actuator Operation in Electric Mobile Machinery

Technical Paper Publication: 111452

Artur Tozzi Cantuarua Gama – Linköping University

Liselott Ericson – Linköping University

Kim Heybroek – Volvo Construction Equipment AB

2. An Energy Management Strategy of Pure Electric Mini Hydraulic Excavator

Technical Paper Publication: 111732

Bingcheng Li – Zhejiang University

Qingfeng Wang – Zhejiang University

Tao Wang – Zhejiang University

Jun Song – Zhejiang University

3. Novel Closed-Circuit Hydrostatic Transmission Without Charge Pump

Technical Paper Publication: 111738

Mohit Bhola – Aalborg University

Torben Ole Andersen – Aalborg University

Morten Kjeld Ebbesen – University of Agder

4. Application of the Hydraulic Transformer Concept to Reduce Throttling Loss in a Multiple Function Load Sensing System

Technical Paper Publication: 111747

Jacob Lengacher – Purdue University

Patrick Stump – CNH Industrial

Andrea Vacca – Purdue University

Ryan Jenkins – CNH Industrial

Francesco Pintore – CNH Industrial

Stefano Fiorati – CNH Industrial

5. Simulative Comparison of Electro-Hydraulic Actuator Circuits for the Application in Excavators

Technical Paper Publication: 111798

Felix Figge – RWTH Aachen University

Katharina Schmitz – RWTH Aachen University

6. Electric and Hydraulic Propel Torque Modulation for a Compact Track Loader With the Hybrid Hydraulic Electric Architecture (HHEA)

Technical Paper Publication: 112035

Jackson Wills – University of Minnesota

Perry Y. Li – University of Minnesota

Session 5A: Controls 3

10:30AM – 12:30PM – Banyan Room

Chair: *Perry Li – University of Minnesota*

Co-Chair: *Roger Fales – University of Missouri*

1. Control of an Asymmetric Cylinder With Two Individually Controlled Pump/Motors

Technical Paper Publication: 109710

Samuel Kärnell – Linköping University

Liselott Ericson – Linköping University

2. Reinforcement Learning-Based Process Optimization and Control of a Hydraulic Press With Multiple Actuators

Technical Paper Publication: 110846

Faried Makansi – RWTH Aachen University

Jingkai Huang – RWTH Aachen University

Katharina Schmitz – RWTH Aachen University

3. Real-Time Prediction of Efficient Operating Points in Quasi-Stationary Agricultural Processes With Hydraulic Implements

Technical Paper Publication: 111383

Benjamin Kazenwadel – Karlsruhe Institute of Technology

Marcus Geimer – Karlsruhe Institute of Technology

4. Parametric Stability Analysis Applied to Complex Pneumatic Systems Using Convex Optimization

Technical Paper Publication: 111398

Gabriel De Carvalho Ferreira Silva – Université Lyon, Liebherr Aerospace Toulouse

Paolo Massioni – Université Lyon

Eric Bideaux – Université Lyon

Sylvie Sesmat – Université Lyon

Frederic Bristiel – Liebherr Aerospace Toulouse

5. A Speed-Controlled Cylinder With Pressure Control and Load-Holding Capability: An Experimental Study

Technical Paper Publication: 111712

Wei Zhao – University of Agder

Mohit Bhola – Aalborg University

Morten Kjeld Ebbesen – University of Agder

Torben Ole Andersen – Aalborg University

6. Practical Implementation of Secondary Control Principles in an Electro-Hydraulic Speed-Variable Drive Applied to an Injection Moulding Machine

Technical Paper Publication: 111868

Rasmus Agaard Hertz – LEGO System A/S

Ole Therkelsen – LEGO System A/S

Søren Kristiansen – LEGO System A/S

Jesper Kjærsgaard Christensen – LEGO System A/S

Christian-Emil Helver – Aalborg University

Lasse Schmidt – Aalborg University

4. Smooth Particle Hydrodynamic as a Computational Model for the Design and Analysis of Hydraulic Components

Technical Paper Publication: 111887

Marvin Durango – Purdue University

Jose Garcia-Bravo – Purdue University

5. Investigation of Frictional Forces in Hydraulic Spool Valves and Their Effect on the Estimation of Axial Flow Forces

Technical Paper Publication: 111904

Simon Hucko – RWTH Aachen University

Tobias Vonderbank – RWTH Aachen University

Katharina Schmitz – RWTH Aachen University

6. Multiscale Simulation of Hydro-Thermal Behavior of a Polymer Under Shear Flow

Technical Paper Publication: 111843

Kosar Khajeh – University of Hyogo

Hitoshi Washizu – University of Hyogo

Session 5B: Hydraulic Fluids, Materials, Rheology, and Tribology

10:30AM – 12:30PM – Cypress Room

Chair: *Eric J. Barth – Vanderbilt University*

Co-Chair: *Feng Wang - Zhejiang University*

1. Novel Design of a General-Purpose In Situ Tribology Test Chamber for Fluid Power Applications

Technical Paper Publication: 111039

Antonio Masia – Purdue University

Giulio Caponeri – Test Industry S.r.l. – Bimal

Stefano Cetra – Test Industry S.r.l. – Bimal

Lizhi Shang – Purdue University

2. Investigation of Lubrication Film Thickness Modeling in Speed Variable Hydraulic Drives Using Adaptive Ultrasound Reflectometry

Technical Paper Publication: 111587

Elias Vagn Hansen – Aalborg University

Per Johansen – Aalborg University

3. Influence of Eco-Friendly Fluids on Poppet Valve Discharge Coefficients

Technical Paper Publication: 111689

Ornella Chiavola – Roma TRE University

Fulvio Palmieri – Roma TRE University

Luigi Tundo – Roma TRE University

Koski Lecture

1:30PM – 2:30PM – Banyan Room

Chair: *Saeid Habibi – McMaster University*

Presenter: *Perry Li – University of Minnesota*

Session 6A: Fault Analysis and Diagnosis

3:00PM – 5:00PM – Cypress Room

Chair: *Adolfo Senatore - University of Naples Federico II*

Co-Chair: *Emma Frosina - Universita del Sannio*

1. Fault Diagnosis of IMVC Hydraulic Cylinder System Based on 1DLCNN-ResNet

Technical Paper Publication: 110440

Wei Sun - Shanghai Jiao Tong University

Jianfeng Tao - Shanghai Jiao Tong University

Heng Liu - Shanghai Jiao Tong University

Hao Sun - Shanghai Jiao Tong University

Chengliang Liu - Shanghai Jiao Tong University

2. Non-Destructive Pressure Impulse Examination for Fatigue Crack Detection in Hydraulic Components

Technical Paper Publication: 110728

Lukas Michiels - Karlsruhe Institute of Technology

Marcus Geimer - Karlsruhe Institute of Technology

3. Slipper Wear in Variable Operating Conditions Technical Paper Publication: 111597

Philip Amos Merkel - RWTH Aachen University

Yannick Duensing - RWTH Aachen University

Katharina Schmitz - RWTH Aachen University

4. Machine Learning for Fault Diagnosis and Operation Mode Detection in Hydraulic Cylinders

Technical Paper Publication: 111893

Jose Solorio - Purdue University

Jose Garcia-Bravo - Purdue University

5. Simulation Study of a Fail-Safe Steer-by-Wire for Heavy Earth Moving Machinery

Technical Paper Publication: 113624

Vinay Partap Singh - Tampere University

Mikko Huova - Tampere University

Tatiana Minav - Tampere University

6. The Impact of Electric Drive Structures on Sensorless AI-Based Hydraulic Valve Fault Classification

Technical Paper Publication: 114712

Viacheslav Zakharov - Tampere University

Abid Abdul Azeez - Tampere University

Xu Han - Norwegian University of Life Sciences

Tatiana Minav - Tampere University

Session 6B: Transmissions/Work Circuits 2

3:00PM – 5:00PM - Banyan Room

Chair: *Victor de Negri - Federal University of Santa Catarina*

Co-Chair: *Steve Weber – Sun Hydraulics*

1. Input Coupled and Output Coupled Power Split Transmission Performance Under Comprehensive Working Conditions

Technical Paper Publication: 111467

Pietro Marani - CNR STEMS

Damiano Chiarabelli - CNR STEMS

Silvia Gessi - CNR STEMS

Massimo Martelli - CNR STEMS

2. Using a Novel Variable Displacement Linkage Motor to Save Fuel in a Compact Track Loader Drivetrain

Technical Paper Publication: 111761

Justinus K. Hartoyo - University of Minnesota

John A.F. Voth - University of Minnesota

Jonatan Pozo-Palacios - University of Minnesota

Grey Boyce-Erickson - University of Minnesota

Martin Herrera Perez - University of Minnesota

Perry Y. Li - University of Minnesota

James D. Van de Ven - University of Minnesota

3. Extended Disturbance Observer-Based Sliding Mode Fault-Tolerant Control for the Dual-Valve Hydraulic Servo System With Reduced-Order Model

Technical Paper Publication: 111768

Huibing Hu - Zhejiang University

Jianhua Wei - The State Key Laboratory of Fluid Power and Mechatronic Systems

Qiang Zhang - Hangzhou Doubltech Electro-Hydraulic Engineering Co. Ltd.

Jin-Hui Fang - Zhejiang University

4. Novel Approaches for the Design of Human Powered Hydraulic Hybrid Vehicle

Technical Paper Publication: 111892
Santiago Guevara-Ocana - Purdue University
Israa Azzam - Purdue University
Jacob Poore - Purdue University
Jose Solorio - Purdue University
Jose Garcia-Bravo - Purdue University
Farid Breidi - Purdue University

5. Analysis and Simulation of Dynamics and Control of a Hydrostatic Wind Turbine

Technical Paper Publication: 111900
Mark Leinberger - University of Minnesota Twin Cities
Kim A. Stelson - University of Minnesota Twin Cities

6. Hydraulic Drive Trains in Wind Turbines for Rapidly Changing Strong Winds

Technical Paper Publication: 111919
Bernhard Manhartgruber - Johannes Kepler University

WEDNESDAY, 10/18/2023

October 18, 2023

Session 7: Fluid Power Components 8:00AM–10:00AM - Banyan Room

Chair: *Fabrizio Paltrinieri - UNIMORE*

Co-Chair: *Qinghui Yuan - Donaldson*

1. Advancements in Noninvasive Pressure Sensing in Hydraulic Components

Technical Paper Publication: 109140
Massimiliano Ruggeri - CNR
Luca Belsito - CNR-IMM
Federico Bosi - Bonfiglioli S.p.A.
Paolo Cominetti - Bonfiglioli S.p.A.
Mattia Ferri - E.S.T.E. S.r.l.
Alberto Roncaglia - CNR-IMM
Matteo Ferri - CNR-IMM

2. The Case for Replacement of Pilot Valves With Pilot Pumps in Hydraulic Control Systems

Technical Paper Publication: 111021
Travis Wiens - University of Saskatchewan

3. Fluid Driven Soft Robotic Gripper With Biomimetic Enclosed Structure and Self-Adaptive Grasp

Technical Paper Publication: 111431
Yaxin Wu - Harbin Engineering University
He Xu - Harbin Engineering University
Siqing Chen - Harbin Engineering University
Qiantiao Wei - Harbin Engineering University
Xiao Xiong - Harbin Engineering University
Hao Yin - Harbin Engineering University

4. A Bionic Underwater Robot Inspired by Jellyfish

Technical Paper Publication: 111439
Xiao Xiong - Harbin Engineering University
He Xu - Harbin Engineering University
Siqing Chen - Harbin Engineering University
Haihang Wang - Harbin Engineering University
Chaochao You - Harbin Engineering University
Yaxin Wu - Harbin Engineering University

5. Static and Dynamic Characteristics of a Self-Expanding Elastic Pressurized Reservoir

Technical Paper Publication: 111683
Jing Yao - Yanshan University
Dingyu Wang - Yanshan University
Jinlu Hao - Yanshan University
Dong Liang - Yanshan University
Aiwen He - Yanshan University

6. Modelling and Simulation of Solenoid Driven Electro Pneumatic Actuator

Technical Paper Publication: 117734
Fatih O. Ercis - Roketsan

Session 8A: Modeling and Simulation

10:30AM–12:30PM - Banyan Room

Chair: *Andrea Vacca – Purdue University*

Co-Chair: *Daniil Dumnov – Danfoss Scotland, Ltd*

1. Improving Fluid Power System Simulation Through an AAS-Based Simulation Framework

Technical Paper Publication: 109807

Malte Becker - RWTH Aachen University

Sebastian Heppner - RWTH Aachen University

Raphael Alt - FLUIDON Gesellschaft für Fluidtechnik GmbH

Tobias Kleinert - RWTH Aachen University

Katharina Schmitz - RWTH Aachen University

2. A Highly Compact, Multi-Material, Fluid Powered Actuation System for MRI-Guided Surgical Intervention

Technical Paper Publication: 110577

John E. Peters - Vanderbilt University

Abby M. Grillo - Vanderbilt University

Daniel S. Esser - Vanderbilt University

Sarah J. Garrow - Vanderbilt University

Nithin S. Kumar - Vanderbilt University

Tyler Ball - Vanderbilt University Medical Center

Robert P. Naftel - Vanderbilt University Medical Center

Dario J. Englot - Vanderbilt University Medical Center

Joseph Neimat - University of Louisville

William A. Grissom - Case Western Reserve University

Robert J. Webster III - Vanderbilt University

Eric J. Barth - Vanderbilt University

3. Mixed Reality Technology: A Virtual Training Tool in Fluid Power Engineering

Technical Paper Publication: 111715

Israa Azzam - Purdue University

Keith Pate - Purdue University

Farid Breidi - Purdue University

4. Modelling of the Entire Aircraft Fuel System Through Simulink for Accurate Performance Evaluation

Technical Paper Publication: 111795

Francesco Sciatti - Polytechnic University of Bari

Paolo Tamburrano - Polytechnic University of Bari

Elia Distaso - Polytechnic University of Bari

Riccardo Amirante - Polytechnic University of Bari

5. Online Monitoring of Pneumatic Actuation System for Energy Efficiency and Dynamic Performance

Technical Paper Publication: 111861

Vinicius Vigolo - Federal University of Santa Catarina

Vladimir Boyko - Technische Universität Dresden

Jürgen Weber - Technische Universität Dresden

Antonio Carlos Valdiero - Federal University of Santa Catarina

Victor Juliano De Negri - Federal University of Santa Catarina

6. Towards Energy-Efficient Semi-Autonomous Operation of Hydraulic Mobile Cranes

Technical Paper Publication: 112957

Victor Zhidchenko - LUT University

Timofei Komarov - LUT University

Heikki Handroos - LUT University

Session 8B: Valves

10:30AM – 12:30PM - Cypress Room

Chair: *Lizhi Shang – Purdue University*

Co-Chair: *Perry Li – University of Minnesota*

1. Experimental Identification of the Full Opening Time of Pneumatic Valves

Technical Paper Publication: 110491

Sylvie Sesmat - Université Lyon

Saïd Chabane - FLUIDE-MECA

Eric Bideaux - Université Lyon

Hubert Lejeune - CETIM - Fluids & Sealing Technologies

Yoann Jus - CETIM - Fluids & Sealing Technologies

2. Optimal Design of Cartridge Check Valve Control Unit in a Multi-Pump Hydraulic System

Technical Paper Publication: 111215

Xiangshuo Xi - Zhejiang University

Qingfeng Wang - Zhejiang University

Tao Wang - Zhejiang University

3. Erosion Wear Analysis and Biomimetic Optimization of Solid Particles on Relief Valve

Technical Paper Publication: 111451

Hao Cao - Harbin Engineering University

He Xu - Harbin Engineering University

Feng Sun - Harbin Engineering University

Weiwang Fan - Harbin Engineering University

4. Investigation of the Temperature Influence on Electrohydraulic Valve Control and Presentation of a Novel Compensation Approach for Independent Metering Valve Systems

Technical Paper Publication: 111588

Lukas Bachmann - Technische Universität Dresden

Jianbin Liu - Technische Universität Dresden

Jürgen Weber - Technische Universität Dresden

5. A Programmable Multi-Functional Pressure-Compensated Flow Valve Based on Differential Pressure Active Regulation

Technical Paper Publication: 111644

Bo Wang - Taiyuan University of Technology

Long Quan - Taiyuan University of Technology

Yunwei Li - Taiyuan University of Technology

Xingyu Zhao - Taiyuan University of Technology

Yunxiao Hao - Taiyuan University of Technology

Lei Ge - Taiyuan University of Technology

6. Simulation Analysis of Flow Characteristics of Valve Check Valve Based on CFD

Technical Paper Publication: 111781

Chao Peng - Sun Yat-sen University

Shuang Tan - Sun Yat-sen University

Sibo Jin - Sun Yat-sen University

Xu Liangbin - Sun Yat-sen University

Chen Lijun - Nanjing Engineering Institute of Aircraft System

Ouyang Xiaoping - Zhejiang University

Session 9: Pumps 3

3:10PM – 4:50PM - Banyan Room

Chair: *Travis Wiens - University of Saskatchewan*

Co-Chair: *Massimiliano Ruggeri - Imamoter*

1. 3D Printed Gerotor Pump Geometries for Soft-Robot Actuation

Technical Paper Publication: 111408

James Gallentine - Vanderbilt University

Eric J. Barth - Vanderbilt University

2. Mechanical Efficiency Prediction of Crescent-Type Internal Gear Pump Considering Floating Balancing Components

Technical Paper Publication: 111553

Dinghao Pan - Purdue University

Andrea Vacca - Purdue University

3. A Survey Study on ePump Design Architectures for Mobile Hydraulics

Technical Paper Publication: 113009

Shanmukh Sarode - Purdue University

Hassan Assaf - Purdue University

Parth Tawarawala - Purdue University

Andrea Vacca - Purdue University

Lizhi Shang - Purdue University

Scott Sudhoff - Purdue University

4. Detection of Typical Manufacturing Errors in External Gear Machines Using Numerical Simulation and Data Driven Machine Learning

Technical Paper Publication: 113369

Pasquale Borriello - University of Naples Federico II

Ajinkya Pawar - Purdue University

Emma Frosina - University of Sannio

Fabrizio Tessicini - Fluid-o-Tech s.r.l.

Andrea Vacca - Purdue University

Adolfo Senatore - University of Naples Federico II

5. An Analysis of Cavitation Phenomena Scalability in Axial Piston Machine

Technical Paper Publication: 113585

Hannah Boland - Purdue University

Lizhi Shang - Purdue University

Authors Last Name	Authors First Name	Submission	Submission Name	Track/Session	Scheduled Day/Time	Room
Achten	Sef		Counteracting Centrifugal Forces on the Cups in a Floating Cup Pump	Pumps 1	10/16/2023, 10:30AM–12:30PM	Cypress Room
Andersen	Torben Ole	111127	Novel Closed-Circuit Hydrostatic Transmission Without Charge Pump	Transmissions/ Work Circuits 1	10/17/2023, 08:00AM–10:00AM	Banyan Room
Azzam	Israa	111738	Mixed Reality Technology: A Virtual Training Tool in Fluid Power Engineering	Modeling and Simulation	10/18/2023, 10:30AM–12:30PM	Banyan Room
Bachmann	Lukas	111715	Investigation of the Temperature Influence on Electrohydraulic Valve Control and Presentation of a Novel Compensation Approach for Independent Metering Valve Systems	Valves	10/18/2023, 10:30AM–12:30PM	Cypress Room
Becker	Malte	111588	Improving Fluid Power System Simulation Through an AAS-Based Simulation Framework	Modeling and Simulation	10/18/2023, 10:30AM–12:30PM	Banyan Room
Boland	Hannah	109807	An Analysis of Cavitation Phenomena Scalability in Axial Piston Machine	Pumps 3	10/18/2023, 03:00PM–04:55PM	Banyan Room
Borriello	Pasquale	113585	Detection of Typical Manufacturing Errors in External Gear Machines Using Numerical Simulation and Data Driven Machine Learning	Pumps 3	10/18/2023, 03:00PM–04:55PM	Banyan Room
Cao	Hao	113369	Erosion Wear Analysis and Biomimetic Optimization of Solid Particles on Relief Valve	Valves	10/18/2023, 10:30AM–12:30PM	Cypress Room
Chabane	Saïd	111451	Experimental Identification of the Full Opening Time of Pneumatic Valves	Valves	10/18/2023, 10:30AM–12:30PM	Cypress Room
Chatterjee	Arpan	110491	Human-in-the-Loop Motion Control of a Two-DOF Hydraulic Backhoe Powered by the Hybrid Hydraulic Electric Architecture (HHEA)	Controls 2	10/16/2023, 01:30PM–02:50PM	Banyan Room
Darnet	Justin	111819	Projection Method for Hydraulic Piston Motor Torque Control	Controls 1	10/16/2023, 10:30AM–12:30PM	Banyan Room
De Carvalho Ferreira Silva	Gabriel	111492	Parametric Stability Analysis Applied to Complex Pneumatic Systems Using Convex Optimization	Controls 3	10/17/2023, 10:30AM–12:30PM	Banyan Room
Dong	Chang	111398	Numerical Study of an Axial Piston Pump: The Effect of Different External Loads on Pressure Ripples	Pumps 1	10/16/2023, 10:30AM–12:30PM	Cypress Room
Dumnov	Daniil	111737	Efficiency of a Digital Displacement Pump Operating With Partial Strokes	Digital Hydraulics	10/16/2023, 08:00AM–10:00AM	Cypress Room
Durango	Marvin	111388	Smooth Particle Hydrodynamic as a Computational Model for the Design and Analysis of Hydraulic Components	Hydraulic Fluids, Materials, Rheology, and Tribology	10/17/2023, 10:30AM–12:30PM	Cypress Room
Ercis	Fatih O.	117734	Modelling and Simulation of Solenoid Driven Electro Pneumatic Actuator	Fluid Power Components	10/18/2023, 08:00AM–10:00AM	Banyan Room

Authors Last Name	Authors First Name	Submission	Submission Name	Track/Session	Scheduled Day/Time	Room
Figge	Felix	111798	Simulative Comparison of Electro-Hydraulic Actuator Circuits for the Application in Excavators	Transmissions/ Work Circuits 1	10/17/2023, 08:00AM-10:00AM	Banyan Room
Gallentine	James	111408	3D Printed Gerotor Pump Geometries for Soft-Robot Actuation	Pumps 3	10/18/2023, 03:00PM-04:55PM	Banyan Room
Guevara-Ocana	Santiago	111892	Novel Approaches for the Design of Human Powered Hydraulic Hybrid Vehicle	Transmissions/ Work Circuits 2	10/17/2023, 03:00PM-05:00PM	Banyan Room
Handroos	Heikki	112957	Towards Energy-Efficient Semi-Autonomous Operation of Hydraulic Mobile Cranes	Modeling and Simulation	10/18/2023, 10:30AM-12:30PM	Banyan Room
Hansen	Elias Vagn	111587	Investigation of Lubrication Film Thickness Modeling in Speed Variable Hydraulic Drives Using Adaptive Ultrasound Reflectometry	Hydraulic Fluids, Materials, Rheology, and Tribology	10/17/2023, 10:30AM-12:30PM	Cypress Room
Hartoyo	Justinus K.	111761	Using a Novel Variable Displacement Linkage Motor to Save Fuel in a Compact Track Loader Drivetrain	Transmissions/ Work Circuits 2	10/17/2023, 03:00PM-05:00PM	Banyan Room
Herrera Perez	Martin	111788	Flow Ripple Minimization in a Triplex Pump Through the Implementation of Various Linkage Mechanisms	Pumps 1	10/16/2023, 10:30AM-12:30PM	Cypress Room
Hertz	Rasmus Aagaard	111497	Control of Hydraulic Injection Moulding Machine With Electro-Hydraulic Variable-Speed Drive	Controls 2	10/16/2023, 01:30PM-02:50PM	Banyan Room
Hertz	Rasmus Aagaard	111868	Practical Implementation of Secondary Control Principles in an Electro-Hydraulic Speed-Variable Drive Applied to an Injection Moulding Machine	Controls 3	10/17/2023, 10:30AM-12:30PM	Banyan Room
Hu	Huibing	111768	Extended Disturbance Observer-Based Sliding Mode Fault-Tolerant Control for the Dual-Valve Hydraulic Servo System With Reduced-Order Model	Transmissions/ Work Circuits 2	10/17/2023, 03:00PM-05:00PM	Banyan Room
Hucko	Simon	111904	Investigation of Frictional Forces in Hydraulic Spool Valves and Their Effect on the Estimation of Axial Flow Forces	Hydraulic Fluids, Materials, Rheology, and Tribology	10/17/2023, 10:30AM-12:30PM	Cypress Room
Johansen	Per	111865	A Digital Hydraulic Full-Bridge Oscillation Transformer	Digital Hydraulics	10/16/2023, 08:00AM-10:00AM	Cypress Room
Johnston	Nigel	110716	Modelling of Pumps and Motors as Source Flow Ripple and Source Impedance	Pumps 1	10/16/2023, 10:30AM-12:30PM	Cypress Room
Kärnell	Samuel	109710	Control of an Asymmetric Cylinder With Two Individually Controlled Pump/Motors	Controls 3	10/17/2023, 10:30AM-12:30PM	Banyan Room
Kazenwadel	Benjamin	111383	Real-Time Prediction of Efficient Operating Points in Quasi-Stationary Agricultural Processes With Hydraulic Implements	Controls 3	10/17/2023, 10:30AM-12:30PM	Banyan Room
Khajeh	Kosar	111843	Multiscale Simulation of Hydro-Thermal Behavior of a Polymer Under Shear Flow	Hydraulic Fluids, Materials, Rheology, and Tribology	10/17/2023, 03:00AM-12:30PM	Cypress Room

Authors Last Name	Authors First Name	Submission	Submission Name	Track/Session	Scheduled Day/Time	Room
Lengacher	Jacob	111747	Application of the Hydraulic Transformer Concept to Reduce Throttling Loss in a Multiple Function Load Sensing System	Transmissions/ Work Circuits 1	10/17/2023, 08:00AM–10:00AM	Banyan Room
Li	Xuguang	111370	The Transition of Wear and Leakage Characteristics of the Cylinder Block/Valve Plate Interface in a Wide Range of Operating Conditions	Pumps 1	10/16/2023, 10:30AM–12:30PM	Cypress Room
Li	Chen	111576	Precision Motion Control of an Independent Metering System With an Adaptive Piecewise Polynomial Valve Model	Controls 2	10/16/2023, 01:30PM–02:50PM	Banyan Room
Li	Bingcheng	111732	An Energy Management Strategy of Pure Electric Mini Hydraulic Excavator	Transmissions/ Work Circuits 1	10/17/2023, 08:00AM–10:00AM	Banyan Room
Liu	Heng	111276	A Feedforward Energy-Saving Control Method for IMVC Hydraulic Cylinder Systems Using the Deep Koopman Operator	Controls 1	10/16/2023, 10:30AM–12:30PM	Banyan Room
Luo	Guifu	111744	Bandwidth Expansion and Resonant Suppression for High-Frequency Electro-Hydraulic Acceleration Control System by Combining Dynamic Pressure Feedback and Three-Variable Control	Controls 1	10/16/2023, 10:30AM–12:30PM	Banyan Room
Makansi	Faried	110846	Reinforcement Learning-Based Process Optimization and Control of a Hydraulic Press With Multiple Actuators	Controls 3	10/17/2023, 1 0:30AM–12:30PM	Banyan Room
Manhartsgruber	Bernhard	111919	Hydraulic Drive Trains in Wind Turbines for Rapidly Changing Strong Winds	Transmissions/ Work Circuits 2	10/17/2023, 03:00PM–05:00PM	Banyan Room
Marani	Pietro	111467	Input Coupled and Output Coupled Power Split Transmission Performance Under Comprehensive Working Conditions	Transmissions/ Work Circuits 2	10/17/2023, 03:00PM–05:00PM	Banyan Room
Masia	Antonio	111039	Novel Design of a General-Purpose In Situ Tribology Test Chamber for Fluid Power Applications	Hydraulic Fluids, Materials, Rheology, and Tribology	10/17/2023, 10:30AM–12:30PM	Cypress Room
Matias	Lukas	111694	Design and Experimental Investigation of an Additively Manufactured High-Speed Switching Valve	Digital Hydraulics	10/16/2023, 08:00AM–10:00AM	Cypress Room
Melling	Jonathan	111507	Comparison of Airborne Sound Quality Between Digital Displacement and Traditional Axial Piston Pumps	Pumps 1	10/16/2023, 10:30AM–12:30PM	Cypress Room
Merkel	Philip Amos	111597	Slipper Wear in Variable Operating Conditions	Fault Analysis and Diagnosis	10/17/2023, 03:00PM–05:00PM	Cypress Room
Michiels	Lukas	110728	Non-Destructive Pressure Impulse Examination for Fatigue Crack Detection in Hydraulic Components.	Fault Analysis and Diagnosis	10/17/2023, 03:00PM–05:00PM	Cypress Room
Palmieri	Fulvio	111687	External Gear Pumps Performance With Graphene Oxide Hydraulic Fluid	Pumps 2	10/16/2023, 01:30PM–02:50PM	Cypress Room
Palmieri	Fulvio	111689	Influence of Eco-Friendly Fluids on Poppet Valve Discharge Coefficients	Hydraulic Fluids, Materials, Rheology, and Tribology	10/17/2023, 10:30AM–12:30PM	Cypress Room

Authors Last Name	Authors First Name	Submission	Submission Name	Track/Session	Scheduled Day/Time	Room
Paltrinieri	Fabrizio	111899	Experimental Investigation of an Innovative High-Speed External Gear Pump Prototype for Advanced Electro-Hydraulic Actuated Automotive Transmissions	Pumps 2	10/16/2023, 01:30PM–02:50PM	Cypress Room
Pan	Dinghao	111553	Mechanical Efficiency Prediction of Crescent-Type Internal Gear Pump Considering Floating Balancing Components	Pumps 3	10/18/2023, 03:00PM–04:55PM	Banyan Room
Pavlis	Vojtech	111913	Digital Displacement Motoring Characteristics of Dynamic Energy Recovery and Hydraulic Transformation	Digital Hydraulics	10/16/2023, 08:00AM–10:00AM	Cypress Room
Pawar	Ajinkya	111670	Prediction of Housing Wear-in in External Gear Machine Considering Deformation Effects	Pumps 2	10/16/2023, 01:30PM–02:50PM	Cypress Room
Peng	Chao	111781	Simulation Analysis of Flow Characteristics of Valve Check Valve Based on CFD	Valves	10/18/2023, 10:30AM–12:30PM	Cypress Room
Peters	John	110577	A Highly Compact, Multi-Material, Fluid Powered Actuation System for MRI-Guided Surgical Intervention	Modeling and Simulation	10/18/2023, 10:30AM–12:30PM	Banyan Room
Qiu	Zhi	111998	Adaptive Sliding Mode Control Based on the Immersion and Invariance Principle for the Accurate Spool Control of Proportional Servo Valve	Controls 1	10/16/2023, 10:30AM–12:30PM	Banyan Room
Ruggeri	Massimiliano	109140	Advancements in Noninvasive Pressure Sensing in Hydraulic Components	Fluid Power Components	10/18/2023, 08:00AM–10:00AM	Banyan Room
Sciatti	Francesco	111795	Modelling of the Entire Aircraft Fuel System Through Simulink for Accurate Performance Evaluation	Modeling and Simulation	10/18/2023, 10:30AM–12:30PM	Banyan Room
Singh	Vinay Partap	113624	Simulation Study of a Fail-Safe Steer-by-Wire for Heavy Earth Moving Machinery	Fault Analysis and Diagnosis	10/17/2023, 03:00PM–05:00PM	Cypress Room
Solorio	Jose	111893	Machine Learning for Fault Diagnosis and Operation Mode Detection in Hydraulic Cylinders	Fault Analysis and Diagnosis	10/17/2023, 03:00PM–05:00PM	Cypress Room
Stelson	Kim	111900	Analysis and Simulation of Dynamics and Control of a Hydrostatic Wind Turbine	Transmissions/ Work Circuits 2	10/17/2023, 03:00PM–05:00PM	Banyan Room
Stump	Patrick	113450	Combined Pump and Compensator Margin Control for Pre-Compensated Load Sensing Architecture: Implementation and Experiments	Pumps 2	10/16/2023, 01:30PM–02:50PM	Cypress Room
Sun	Wei	110440	Fault Diagnosis of IMVC Hydraulic Cylinder System Based on 1DLCNN-ResNet	Fault Analysis and Diagnosis	10/17/2023, 03:00PM–05:00PM	Cypress Room
Tawarawala	Parth	113009	A Survey Study on ePump Design Architectures for Mobile Hydraulics	Pumps 3	10/18/2023, 03:00PM–04:55PM	Banyan Room
Tozzi de Cantuaría Gama	Artur	111452	An Analysis of a Multi-Pump System for Actuator Operation in Electric Mobile Machinery	Transmissions/ Work Circuits 1	10/17/2023, 08:00AM–10:00AM	Banyan Room

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van Binsbergen-Galàn	Mikkel	109823	Impact of Motion Simultaneity in Determination of Design Load Cycles for an Electro-Hydraulic Variable-Speed Drive Network	Controls 1	10/16/2023, 10:30AM–12:30PM	Banyan Room
Vigolo	Vinicius	111861	Online Monitoring of Pneumatic Actuation System for Energy Efficiency and Dynamic Performance	Modeling and Simulation	10/18/2023, 10:30AM–12:30PM	Banyan Room
Vigolo	Vinicius	111940	An Analysis of a Digital Electro Hydrostatic Actuator for Application in Aircraft Flight Control Systems	Digital Hydraulics	10/16/2023, 08:00AM–10:00AM	Cypress Room
Wang	Bo	111644	A Programmable Multi-Functional Pressure-Compensated Flow Valve Based on Differential Pressure Active Regulation	Valves	10/18/2023, 10:30AM–12:30PM	Cypress Room
Wang	Dingyu	111683	Static and Dynamic Characteristics of a Self-Expanding Elastic Pressurized Reservoir	Fluid Power Components	10/18/2023, 08:00AM–10:00AM	Banyan Room
Wang	TianZhu	111741	Disturbance Observer-Based Nonlinear Motion Control of the Parallel Platform for Wave Compensation	Controls 1	10/16/2023, 10:30AM–12:30PM	Banyan Room
Wiens	Travis	111021	The Case for Replacement of Pilot Valves With Pilot Pumps in Hydraulic Control Systems	Fluid Power Components	10/18/2023, 08:00AM–10:00AM	Banyan Room
Wills	Jackson	112035	Electric and Hydraulic Propel Torque Modulation for a Compact Track Loader With the Hybrid Hydraulic Electric Architecture (HHEA)	Transmissions/ Work Circuits 1	10/17/2023, 08:00AM–10:00AM	Banyan Room
Wu	Yaxin	111431	Fluid Driven Soft Robotic Gripper With Biomimetic Enclosed Structure and Self-Adaptive Grasp	Fluid Power Components	10/18/2023, 08:00AM–10:00AM	Banyan Room
Xi	Xiangshuo	111215	Optimal Design of Cartridge Check Valve Control Unit in a Multi-Pump Hydraulic System	Valves	10/18/2023, 10:30AM–12:30PM	Cypress Room
Zakharov	Viacheslav	114712	The Impact of Electric Drive Structures on Sensorless AI-Based Hydraulic Valve Fault Classification	Fault Analysis and Diagnosis	10/17/2023, 03:00PM–05:00PM	Cypress Room
Zhao	Wei	111712	A Speed-Controlled Cylinder With Pressure Control and Load-Holding Capability: An Experimental Study	Controls 3	10/17/2023, 10:30AM–12:30PM	Banyan Room
Zheng	Sheng	111833	Online Dynamic Model Correction for Hydraulic Manipulator Grasped Unknown Payload	Controls 2	10/16/2023, 01:30PM–02:50PM	Banyan Room
Xiong	Xiao	111439	A Bionic Underwater Robot Inspired by Jellyfish	Fluid Power Components	10/18/2023, 08:00AM–10:00AM	Banyan Room

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2A Session 2 – Controls 1

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2B Session 3 – Pumps 1

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3A Session 4 – Controls 2

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3B Session 5 – Pumps 2

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4 Session 6 – Transmissions/Work Circuits 1

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5A Session 7 – Controls 3

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5B Session 8 - Hydraulic Fluids, Materials, Rheology, and Tribology

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6B Session 9 - Fault Analysis and Diagnosis

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6A Session 10 - Transmissions/Work Circuits 2

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7 Session 11 - Fluid Power Components

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8A Session 12 - Modeling and Simulation

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8B Session 13 - Valves

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9 Session 14 – Pumps 3

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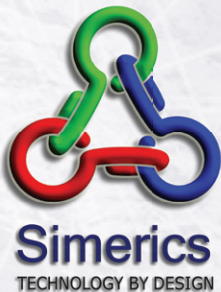
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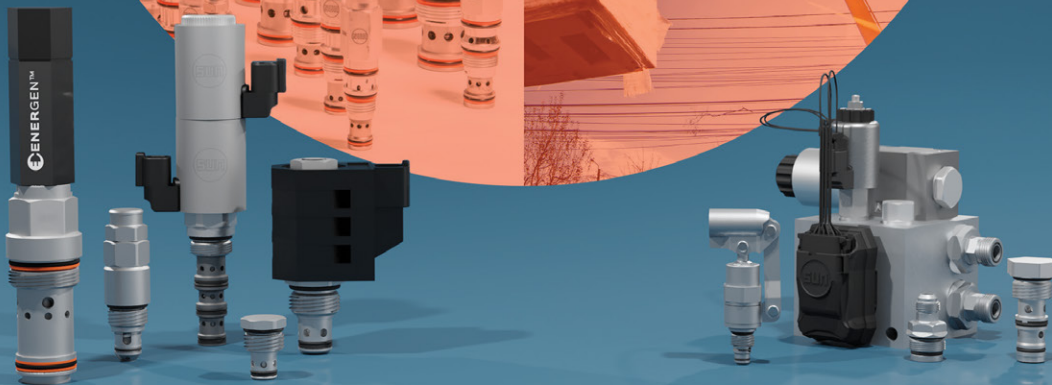


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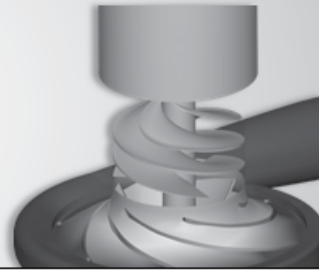
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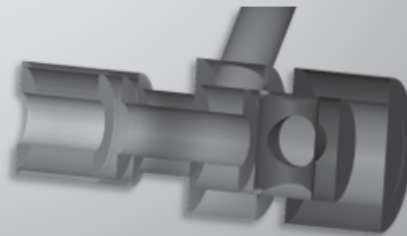
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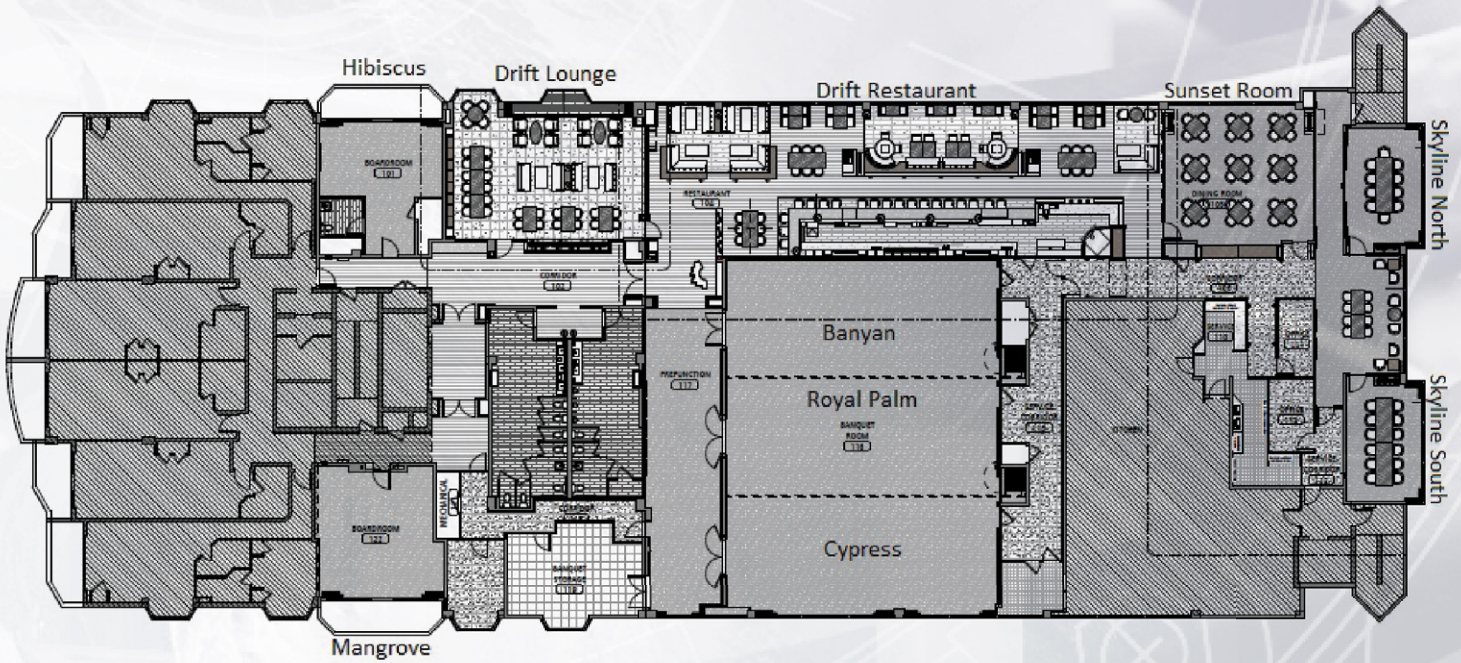
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