



Monika Ivantysynova

Ph.D. Technical University Bratislava, Czechoslovakia - 1983

MAHA Fluid Power Systems Professor

Purdue Innovator Hall of Fame

SAE Fellow 2014

Backe Medal 2012

Honorary Doctorate *Doctor Honoris Causa*, Slovak Technical University

Joseph Bramah Medal 2009

Research Areas:

Fluid Power System Design, Modeling and Multi-domain Simulation. Energy saving actuators, advanced transmission concepts, drive line control, computer based optimization of positive displacement pumps and motors, smart structures, optimization of tribological systems by surface modification in micro- and nanoscale.

Classes Taught:

ABE 591D/ME 597 – Design & Modeling of Fluid Power Systems

ABE 691M/ME 697M– Hydraulic Power Trains & Hybrid Systems

Selected Publications (last 5 years):

- Vacca, A., Klop, R. and Ivantysynova, M. 2010. A numerical approach for the evaluation of the effects of air release and vapour cavitation on effective flow rate of axial piston machines. *International Journal of Fluid Power*, Vol. 11, No. 1, pp. 33 - 46.
- Ivantysynova, M. 2010. Maha Fluid Power Research Center – Future Trends in Fluid Power. *Journal of the Japan Fluid Power System Society*. Vol. 41, No 1, pp. 31 – 34. – invited paper
- Seeniraj, G. and Ivantysynova, M. 2011. A Multi-Parameter Multi-Objective Approach to Reduce Pump Noise Generation. *International Journal of Fluid Power*, Vol. 12, No. 1, pp. 7 - 17.
- Kumar, R. and Ivantysynova, M. 2011. An instantaneous optimization based power management strategy to reduce fuel consumption I hydraulic hybrids. *International Journal of Fluid Power*, Vol 12, No. 2, pp. 15-25.
- Seeniraj, G.K., Zhao, M. and Ivantysynova, M. 2011. Effect of Combining Precompression Grooves, PCFV and DCFV on Pump Noise Generation. *International Journal of Fluid Power*. *International Journal of Fluid Power*, Vol. 12, No. 3, pp. 53-64.
- Klop, R. and Ivantysynova, M. 2011. Investigation of noise sources on a series hybrid transmission. *International Journal of Fluid Power*, Vol. 12, No. 3, pp. 17-30.
- Kumar, R. and Ivantysynova, M. Dynamic programming based optimal control for assessing the fuel economy of hydraulic hybrids. *International Journal of Fluid Power*, in review.
- Pelosi, M. and Ivantysynova, M. 2012. Heat Transfer and Thermal Elastic Deformation Analysis on the Piston/Cylinder Interface of Axial Piston Machines". *ASME Journal of Tribology*. Vol. 134, October 2012, pp. 1- 15.
- Pelosi, M. and Ivantysynova, M. 2012. A Geometric Multigrid Solver for the Piston-Cylinder Interface of Axial Piston Machines. *Tribology Transactions*, Vol. 55, Issue. 2, pp. 163 – 174.
- Busquets, E. and Ivantysynova, M. 2013. Temperature prediction of Displacement Controlled Multi-actuator machines. *International Journal of Fluid Power*, Vol. 14, No. 1, pp. 25 - 36.
- Pelosi, M. and Ivantysynova, M. 2013. The Impact of Axial Piston Machines Mechanical Parts Constraint Conditions on the Thermo-Elastohydrodynamic Lubrication Analysis of the Fluid Film Interfaces. *International Journal of Fluid Power*, Vol. 14, No. 3, pp. 35-51
- Daher, N. and Ivantysynova, M. 2014. An Indirect Adaptive Velocity Controller for a Novel Steer-by-Wire System. *ASME Journal of Dynamic Systems, Measurement, and Control*, Vol. 136, Issue 5, pp. 051012, online version
- Daher, N. and Ivantysynova, M. 2014. A Virtual Yaw Rate Sensor for Articulated Vehicles Featuring Novel Electro-Hydraulic

Steer-by-Wire Technology. *Control Engineering Practice*, Vol. 30, pp. 45-54, online version

Daher, N. and Ivantysynova, M. 2014. Energy Analysis of an Original Steering Technology that Saves Fuel and Boosts Efficiency. *Energy Conversion and Management*, Vol. 86, pp. 1059-1068 online version

Kim, T., Kalbfleisch, P., and Ivantysynova, M. 2014. The effect of cross porting on derived displacement volume. *International Journal of Fluid Power*, Vol. 15, Issue 2, pp. TBD, online version.

Busquets, E. and Ivantysynova, M. 2014. Discontinuous projection-based adaptive robust control for displacement controlled actuators. *ASME Journal of Dynamic Systems*. Under review.

Busquets, E. and Ivantysynova, M. 2014. A Multi-Actuator Displacement-Controlled System with Pump Switching – A Study of the Architecture and Actuator-Level Control. *Transactions of the Japan Fluid Power System Society*. Under review.

Schenk, A. and Ivantysynova, M. 2014. A transient thermoelastohydrodynamic lubrication model for the slipper / swashplate in axial piston machines. *ASME J. Tribology*. Under review.

Shang, L. and Ivantysynova, M. 2014. Port and case temperature prediction for axial piston machines. *International Journal of Fluid Power*. Under review.

Hippalgaonkar, R. and Ivantysynova, M. 2014. Near-Optimal Power Management for Hydraulic Hybrid Multi-Actuator Machines – Part 1: Theoretical studies, modeling and simulation. DS-14-1465. *ASME Journal of Dynamic Systems, Measurement, and Control*. Under review.

Hippalgaonkar, R. and Ivantysynova, M. 2014. Near-Optimal Power Management for Hydraulic Hybrid Multi-Actuator Machines – Part 2: Machine Implementation and measurement. DS-14-1466. *ASME Journal of Dynamic Systems, Measurement, and Control*. Under review.

Selected Conference Presentations:

- The Secret of the Fluid Film in Piston Machines. The 8th International Conference on Fluid Power Transmission and Control (ICFP 2013), Apr. 9-11, 2013. Hangzhou, China - **Keynote Speech**
- Displacement Control Actuation Future and Challenges of Fluid Power. Beihang University - Workshop on Fluid Power Systems, Apr. 11, 2013. Beijing, China - **Keynote Speech**
- Fuel Savings through Hydraulic Hybrid System Technology. Joint ASABE / SAE Meeting, Jun. 19, 2013. Chicago, IL, USA
- Displacement Control & Hydraulic Hybrids - Future of Fluid Power. Evonik Global Hydraulic Segment Meeting, Jul. 9, 2013. Philadelphia, PA, USA
- Optimized fluid films essential for displacement control & hydraulic hybrid systems. ExxonMobile, Feb. 2014. Philadelphia, PA, USA
- Debate Hydraulic vs. Electric Drive. The 8th FPNI PhD Symposium, Jun. 12, 2014. Lappeenranta, Finland