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Pressure shifted and displacement adjusted valve timing

Methods for adjusting hydraulic pump/motor valve timing.

IP Status: Provisional Patent Application Filed; **Application #:** 63/076,645

Applications

- Hydraulic pumps and motors

Technology Overview

All hydraulic motors and many hydraulic pumps require active valves to control flow entering and exiting the fluid chambers of the machine. Poorly designed valve timing and area profiles can cause a substantial decrease in efficiency due to throttling losses. In addition, the energy lost due to throttling is absorbed by the working fluid, raising the temperature of the fluid and requiring a larger cooling system.

Researchers at the University of Minnesota have developed new methods for optimizing valve timing of a hydraulic actuator/motor. This technology includes two different approaches: a pressure shifted valve timing approach, and a displacement adjusted valve timing approach. Both of these methods for changing valve timings allow for fully mechanical valve actuation, which is a more reliable method than electrical actuation.This technology offers a variety of methods to actuate the adjustable valve timing including hydraulic rotary actuators (vane or screw type), linear actuators, or electric motors coupled to gear drives. A key advantage of this technology is that the valve timing can be created using a fixed geometry, such as a simple valve plate (that is low cost), and the variability comes from angularly adjusting that fixed geometry. Other advantages include: Improved efficiency Reduced noise Higher reliability Simple implementation

Phase of Development

TRL: 2-3
Proof of concept/simulation

Desired Partnerships

This technology is now available for:

- License
- Sponsored research
- Co-development

Please contact our office to share your business' needs and learn more.

Licensing Terms

Technology ID
2021-043

Category
Engineering & Physical Sciences/Design Specifications
Engineering & Physical Sciences/Instrumentation, Sensors & Controls
Engineering & Physical Sciences/Transportation

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Researchers

- **James Donald Van de Ven, PhD** Professor, Mechanical Engineering
- **Thomas R. Chase, PhD** Professor, Mechanical Engineering

References

1. Boyce-Erickson, Grey C., Thomas R. Chase, and James D. Van de Ven. , https://doi.org/10.1115/FPMC2020-2779, Fluid Power Systems Technology. Vol. 83754. American Society of Mechanical Engineers, 2020.