

Title: Modulated switching control of ON/OFF Poppet valves for proportional flow control in hydraulic systems.

Inventors:

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Description:

Our invention describes a novel switching technique for the solenoid operated ON/OFF poppet valves. This technique enables the ON/OFF poppet valves to provide proportional flow control of hydraulic systems. The resulting system possesses the contaminant immunity associated with the use of poppet valves with little increase in complexity of the poppet control circuit. We achieve the proportional control by high frequency excitation of the valve poppet at varying duty cycle. This effectively floats the poppet and adjusts the flow rate. The results have been tested in the laboratory both experimentally and on Matlab simulations.

Achieving proportional flow control using cheap and easy to use ON/OFF poppet valves is extremely relevant to sectors of industry that adopt hydraulic fluid power actuators and who desires flow control without the disadvantages of servo and/or proportional valves.

We have developed a switching strategy as well as a microcontroller circuit to implement the switching strategy. We are developing a compact manipulator for underwater ROVs using this technology.



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Claims

A novel switching technique that permits, poppet valves, proportional flow control. This is achieved with a minimal increase in control circuit whilst maintaining the high immunity from contaminants that is associated with poppet valves.

We claim:

1. Low cost proportional flow control for solenoid operated on/off poppet valves.
2. PWM switching method for poppet solenoid valve allowing proportional flow control

Additional claims:

3. Simulation of the processes – this assists in identifying the appropriate switching frequency and duty cycle
4. Experimental verification.