

Synopsis

Hydraulic systems are widely employed in many applications due to their ability to convert mechanical energy into hydraulic energy. It can be regulated and controlled to provide flow rate, force, speed and direction with the help of direction control valve.

The direction control valve employed in the hydraulics classified as single stage and two stage valve. High bandwidth, high flow rate electro hydraulic valves typically have two or more stages. Most multi-stage valves are expensive, require meticulously clean fluid, and introduce higher order dynamics. On the other hand, single-stage spool valves are cheaper and more reliable. However, a majority of them are not suitable for high bandwidth, high flow rate applications due to limitations of the electromechanical/solenoid spool-stroking actuators.

In recent years, the trend is to replace the solenoid valve with a programmable controlled valve. The result is that the valve can be located remotely from the operator, improving safety and comfort as well as increasing mechanical design flexibility. The use of such micro controlled hydraulic valves has the sophisticated electronic control system to control the flow rate to the actuator.

In the present research work is intended to replace a standard four-way solenoid valve with a micro controlled directional control valve. The use of a programmable valve allows controlling the spool position of the directional control which in turn controls the speed of the actuator. This valve also improves the feasibility of overcoming the limitation of solenoid valve by modeling and simulation of the directional control valve. Experimentation is carried out for the carried out to determine the differential pressure and flow (Δp -Q) characteristic, p-Q characteristics, in valve.