

# Abstract

Hydraulic actuators are widely used on mobile equipment and robots, due to their good capability in positioning especially in servo system, fast and smooth response, high power density, environment tolerance, and compact size.

Using actuators for constant speed operation hydraulic systems is highly required in many applications such as steel sheet rolling, pressing operations, production, oil and gas subsea applications assembly lines, robotics, aircrafts equipment and submarine systems. However, accepted positioning in the applications requires an accurate electro-hydraulic actuator facing several problems such as (internal and external leakage, backpressure, and load).

A variable-pump and/or valve-controlled may be used to control the actuator velocity in a constant speed operation. The valve control may be done by using a proportional directional valve while the variable-pump may be used either by a variable displacement or variable speed pump. They may be used to satisfy the actuator flow-demand due to any system disturbance or system leakage.

An experimental test rig has been carried out, equipped with variable displacement vane pump and 4/3 Electro-hydraulic proportional direction control valve EHPDV with its proportional amplifier, to investigate the hydraulic system performance and to measure the operating parameters to evaluate the system dynamic and steady state characteristics of the studied hydraulic system.

The measured parameters have been directly connected to the data acquisition system to store the measured parameters. A LABVIEW program has been constructed to read the measured value from the sensors; displacement and pressure.

Investigations have been carried out using both methods; pump control and valve control to decide which one is more effective in a certain operation conditions and pressure ranges in the experimental work.