

HOMWORK / LAB TEST #3
Tuning and operating servo hydraulic actuators

Scope: (a) Tune and operate a servo-controlled seismic actuator; (b) Evaluate a column specimen in elastic (and inelastic range)

- a) Determine all components required to operate an actuator (see [diagram](#))
 - 01) Actuator components ([cylinder](#), [servovalve controller](#), [load cell](#) + [calibration sheet](#), [displacement transducer + calibration sheet](#))
 - 02) *Program initiation*: manual, ramps, sinusoidal, square – **set program to square sine**
 - 03) *Establish feedback*: first: **displacement** and second: **force** transducer – **zero position using set point**
 - 04) *Identify error signal*: **set error to zero before turning power**
 - 05) *Determine limits*: **set limits for both force and displacement**
 - 06) *Hydraulic Power controller* – low, high, program, emergency stop – **power system**
- b) Tune actuator first with **displacement feedback**, then second with **force feedback**
 - 01) Adjust (in this order) **P, I, D and F gains**, if necessary. See [practical notes](#)
 - 02) Observe actuator response (record screens showing the tuning).
 - 03) Record final settings of **P, I, D and F gains**
- c) Test the column after tuning the actuator using 3 cycles of “saw-tooth” sine using mplitude of .2 in or 1.0 Kips. Evaluate the force displacement diagram using:
 - 01) Displacement control using amplitude of .2 in
 - 02) Force control using amplitude of 1.0 Kips.
- d) For extra points: Develop a model for the actuator using the theoretical formulation using Matlab or equivalent. Simulate the operation of the actuator with various parameters. Compare calculated with observed.
- e) Forr extra points answer the following question: Check the sensitivity of the testing using the model of the actuator. Can the model of the actuator help in getting identical results from force and displacement controls?

Note: Prepare report according to standard outline

Due date: 2008-10-27