HOMEWORK / 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, alternative servovalve controller, load cell + calibration sheet, displacement transducer + calibration sheet, *FlexTest Controller*)
    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 amplitude 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) For 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?

Reference:

MTS FlexTest GT, Model 793 System Software

   Note: Prepare report according to standard outline   ***Due date: 2011-11-01 (111101)***