Program operates in time domain.

System motions are assumed linear (good approximation for sub-micron motion).

Program simulates an arbitrary set of blocks, connected by springs.

Block linear and angular momentum and spring damping are included.

Measurements (block to block distance), including noise, and DC roll off are included.

Actuators modeled as producing forces between blocks.

Program calls a feedback algorithm, which is passed a set of measurements, and responds with a set of control outputs. This algorithm is written in C, and can be directly translated to the C code.

Setup: 10KHz feedback (50KHz internal time step) -> Execution speed ~1/5 real time (on Sun enterprise 420).
System Configuration

- Block 0: Ground, 3000Kg, 1x1x1 M.

- 3 springs, f=5Hz

- 3 Actuators

- 3 vertical accelerometers
  - 2 horizontal
  - 1 block end

- Accelerometer Housing
  - M=64gm
  - Housing spring X4 f=4000Hz

- Accelerometer HP
  - time constant = 10 sec

- Accelerometer test mass
  - M=120Gm
  - F(vert) = 700Hz
  - F(horiz) = 1500Hz

- Side Actuators
  - f=4Hz

- Main Block

- 1 end spring
  - f=2.8 Hz

- 2 balanced end actuators

- 3 springs, f=5Hz
System Z Response to Z Step
System Y response to Z step
Tasks - Simulator:

Program: Add arbitrary ground motion input to program (easy).

Feedback: Complete development of sensor filter algorithm. (mostly done)

Feedback: Develop self-tuning feedback (big job).

Tasks - Other:

Re-check noise on sensors: Note, with 700Hz resonance (specified), Acceleration noise of 0.1µm/sec²/sqrt(Hz), corresponds to a position measurement of $2 \times 10^{-11}$M/sqrt(Hz). Thermal noise for 120gm, at 700Hz resonance is $5 \times 10^{-14}$M (KT noise). Should be OK. Need to re-measure sensors.

Hardware design underway: Need to detail block supports, springs, etc.

DAQ hardware, software ordered. Need to find out about crate / controller.