**Homework 5**

You are to use marker data and ground reaction force data for 1legged squat and 2legged squat to accomplish the following tasks. An example input setting files for 1legged squat was also included.

Note:

1. I have found a small error in the old grf.mot, and have been corrected. Use the **new file** (.trc file is the same as the old one.) for this homework (**Don’t forget to transform the new grf.mot data to match OpenSim Coordinates).**
2. This task is based on the scaled model, inverse kinematics results you have accomplished in Homework 4.
3. You are to modify example setting files to fit your own simulation and different motions, e.g. mass, height, time range, file name etc. Detailed instructions about input setting files can be found in **OpenSim User’s Guide** chapter 19-20 (<https://simtk.org/docman/?group_id=91>, registration required).
4. Do not forget **LOCK** subtalar joint and mtp joint before performing residual reduction and computed muscle control.
5. Please do not forget to LABEL all graphs and include UNITS.
6. **Deadline: 19:00, Wednesday March 9th, 2011.**

**For** up **to 2 points:**

Perform Residual Reduction, computed muscle control and forward dynamics on 1legged squat and 2legged squat (stance leg only).

* For each motion, answer the questions 1-4 and 7 in the Tutorial 4.
* For each motion, plot all hip extensors’ excitation pattern Vs. Time on the same graph. Describe and discuss your findings.
* Draw plots for all hip flexors, hip abductors, knee extensors and ankle plantarflexors’ excitation Vs. Time (same muscle group in one figure). Describe and discuss your findings.

**For up to 3 points:**

* Is any knee extensor, hip abductor or plantarflexor muscle excitation DOUBLED (or more) in the 1-legged squat vs. the 2-legged? Describe and discuss your findings.
* Are the same knee extensor muscles/muscle excitations involved in the descent as in the ascent in the 1-legged stance? Describe and discuss. Keep in mind that one of these is bi-articular.
* Find a time interval with significant joint co-contraction (i.e., opposing muscle groups are both activated/excited – for instance, both extensors and flexors. You pick the joint) in the 1-legged stance, stance leg. Discuss and explain this co-contraction.