**Homework 4**

You are to use the given marker data and ground reaction force data to accomplish following tasks (marker data is restored in .trc file and ground reaction force data is restored in .mot file). An example input setting files for 1legged squat was also included.

Note:

1. You are to prepare your data file to match OpenSim Coordinates.
2. You are to modify example setting files to fit your own simulation and different motions, e.g. mass, height, time range, file names etc. Detailed introductions about input setting files can be found in **OpenSim User’s Guide** chapter 14-16, 23(<https://simtk.org/docman/?group_id=91>, registration required.).
3. **Deadline: 19:00, Wednesday March 2nd, 2011**

**For up to 1 point:**

Perform Scaling, inverse kinematics, and inverse dynamics on 1-legged squat and 2-legged squat (stance leg only), low and high jump.

* For each motion, answer questions **5, 6, 7, 10** in the Tutorial 3.
* For each motion, plot ankle, knee and hip joint angle in the sagittal plane and describe your results in text.
* For each motion, plot ankle, knee and hip moment in the sagittal plane and describe your results in text.

**For up to 2 point:**

Additional analysis of the forward jump (take-off + landing)

* Compare ankle, knee and hip joint angle of all motions to the joint angles you calculated in Homework 1. What are the differences? Which joint has the biggest differences? Comments?
* Compare ankle, knee and hip joint moment of all motions to the joint moments you calculated in Homework 2. What are the differences? Which joint has the biggest differences? Comments?

**For up to 3 point:**

* Based on your knowledge and these assignments, what are the possible resources of errors in the kinematic and kinetic analysis in OpenSim?
* Based on your experience, can you adjust marker weights in **static post weight** tab to re-scale your model to lower **total weighted squared error**?If yes, state the new marker weights and the reason. Why these marker weights affect errors?
* Based on the new scaled models, can you adjust marker weights in the **Weight** tab to re-run inverse kinematics to lower **total weighted squared error?** If yes, state the new marker weights and the reason. Why these marker weights affect errors? You can choose any three of the motions.