

Specifying External Loads in Tutorial 3

OpenSim 2.4 has a new process for applying external loads that is more flexible, but requires an additional set-up step. The External Loads setup file (subject01_walk1_grf.xml) needed in the Inverse Dynamics section of Tutorial 3 can be generated using the following steps. You can also download this file from the OpenSim downloads page: https://simtk.org/project/xml/downloads.xml?group_id=91

1. From within the Inverse Dynamics Tool, select the External Loads tab and make sure the External Loads box is checked.
2. Delete the text currently in the red-highlighted box if any.
3. Edit the External Loads settings by clicking the pencil icon.
 - a. Click on the folder icon next to the Force data file box. Check that you are in the Gait2354_Simbody folder and select subject01_walk1_grf.mot as the Force data file. This file describes the force applied at the foot's center of pressure described in the lab reference frame (that's the case for the data files in the tutorial). You may be asked to re-save the *.mot file with the GRFs if the labels are not unique (which is true for most GRF files pre-2.0). If this occurs, click save and continue or re-name so you don't overwrite the original file.
 - b. Similarly, select Subject01_walk1_ik.mot as the Kinematics for external loads file.
 - c. Check the box to filter at 6Hz. This is the suggested level for walking. This value should be higher for running (10-20Hz), and maybe even higher for quicker movements or movements with higher impact.
 - d. Forces listed in the motion file are added as individual forces by hitting the Add button.
 - i. Provide a name (e.g. "Right_GRF")
 - ii. Select the body where the force is applied: calcn_r
 - iii. Check Applies Force and select Point Force
 - iv. Force Columns: Select the labels/columns from the grf.mot file that contains the forces. For this file, it is ground_force_v. Select "ground_force_vx", and then y & z will be selected automatically
 - v. Point Columns: Select the labels/columns from the grf.mot file that contains the points where those forces are applied. For this file, it is ground_force_p. Select "ground_force_px" and then y & z will be selected automatically.
 - vi. The GRF free moment is a torque, so check "Applies Torque"
 - vii. Torque Columns: scroll down and select "ground_torque_x"
 - viii. Both the GRF and CoP are expressed in the ground (lab) frame
 - ix. Click OK
 - e. Repeat (d) for the left leg by clicking "Add" again.
 - f. Hit Save and enter a filename for the External Force: subject01_walk1_grf.xml

You can now proceed with running the Inverse Dynamics Tool as described in the tutorial. If you reload the Inverse Dynamics settings file, the External Loads box should no longer be highlighted in red.