Inverse Kinematics

1. Load a model

In this workshop we use gait2392 from the OpenSim model library, scaled to the patient from the "Fifth Grand Challenge Competition to Predict In Vivo Knee Loads".

The scaled .osim model, prepared during the scaling step, can be found in the "4_Inverse_Kinematics" folder with name **workshopGait2392-scaled.osim**

2. Inverse kinematics toolbox

.xml setup file for inverse kinematics is located in the "4_InverseKinematics" folder and called "**SetupIK.xml**". You can load this file in the OpenSim "Inverse Kinematics" tool to use this setup or create your own. The .trc files with gait marker coordinates used for inverse kinematics in this workshop was prepared during the data import step and are called "**transformed_Gait.trc**" and "**transformed_Gait_cropped.trc**".

3. Tips for Inverse Kinematics

- Technical markers and anatomical markers are used for inverse kinematics.

- Markers should be weighted based on the soft tissue artefact they are subject to ("Weights" tab of the IK tool).

- Marker weights are relative.

- In the OpenSim messages Window, RMSE marker error should be less than 1cm.

- In the OpenSim messages Window, maximum marker error should be less than 2cm.

NOTE: Some markers positioned in anatomical landmarks were removed after the static trial measurements, so they are missing in the walking trials that we will process during the workshop.

4. Results

Joint kinematics are stored in a .mot file which can be open in Excel. The inverse kinematics results from the gait cycle used for this workshop are stored in the "4_InverseKinematics" folder and called "**transformed_Gait_IK_results.mot**" and "**transformed_Gait_cropped_IK_results.mot**".

5. Useful links

More information and best practices are available at this link:

https://simtk-confluence.stanford.edu/display/OpenSim/Inverse+Kinematics