Force Overview

This topic refers to the representation of external forces and how these forces are included in the inverse dynamics calculations.

If you are searching for the computation of Forces and Moments, see the section on Inverse_Dynamics.

The traditional force recorded for Inverse Dynamics of gait analysis is derived from a Force Platform.

In recent years force sensors have been included in a variety of structures, such as Steps and Treadmills. Visual3D treats these forces as Force Structures, which are really structures attached to force platforms or to contiguous force platforms spaced in a grid.

In order to include a force in the Inverse Dynamics calculations it is necessary to assign the force to a segment. In many cases, force platforms or force structures, Visual3D attempts to assign the forces automatically.

Forces can also be defined by the user, and assigned to a segment.

Force Assignment

Force Assignments

Bad Assignments

Force Representation

Force Representation

Force Platforms

A lecture on Force Platforms created by Tom Kepple.

Force Structures

Force Structures were conceived as a mechanism for combining force platform data (e.g. treating several contiguous platforms as a single platform), and for accommodating structures that are attached to the force platform as a super-structure such as the stairs manufactured by AMTI.

Treadmills

Instrumented Treadmills

Dynamic_Force_Platforms

Some force platforms have the ability to move during a trial. However, the C3D file format is only set up to handle static force platforms, which makes it difficult to account for a dynamic force platform. This page is devoted to handling a moving platform within Visual3D.

Model Based Items

The model based items for assigned forces

GRF_DATA COP Path

Use Processed Forces for Segment to Force Assignments

Info related to filtering the FORCE, COFP, and FREEMOMENT signals.

CalTester_Mode

Using a computational method based on static equilibrium, it is possible to independently measure the rod's orientation and tip position during the movement trial, using force platform derived data exclusively, and to compare these estimates to rod orientation and tip position estimates derived exclusively from the motion capture component. The degree of spatial and temporal agreement between these two sets of data provides an assessment of the joint working status of the kinetic and kinematic systems. A small number of variable are calculated and presented for inspection&emdash;these enable the user to detect the presence of errors from a large number of potential sources.

Force_Vector_Colors

In Visual3D version 4 we have introduced a color scheme for animating forces.

1. The red arrow is the force on the Force Platforms.
2. The blue arrow is a Force Assignment (not necessarily related to a force platform) to a segment.
3. The yellow arrow is a force on a Force Structures (e.g. a step).

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