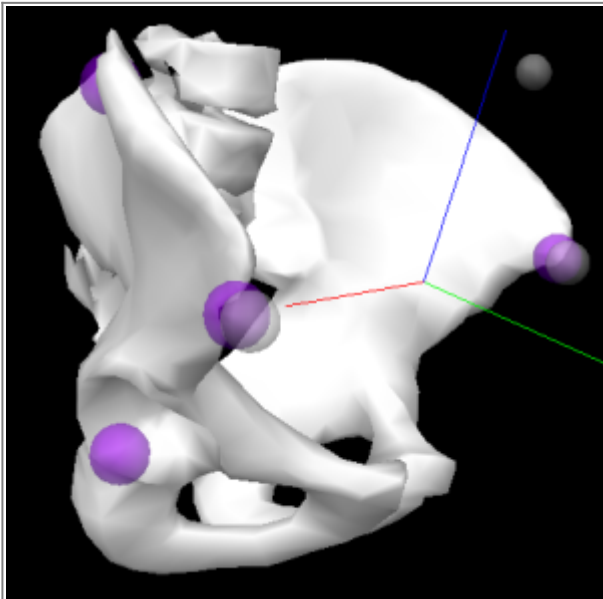


Example: Normalizing the Pelvis Segment Angle

Both the [Coda](#) and [Helen Hayes \(Davis\)](#) definitions of the pelvis segment are tilted forward approximately 20 degrees from the horizontal. In describing the orientation of the pelvis or for describing the hip joint angle, however, it is often convenient to define a pelvis angle that has a coronal plane parallel to the floor, e.g., a vertical segment with zero tilt.



An example pelvis segment. The segment coordinate system's coronal plane is not aligned with the floor.

This example demonstrates how to create a [virtual \(kinematic only\) pelvis segment](#) that uses the same tracking as your default Coda or Helen Hayes pelvis but has a segment coordinate system whose coronal plane is parallel with the floor. This results in [normalizing](#) the hip joint angle.

Landmark Definitions

We need to define landmarks along the Iliac Crest which are positioned vertically above the hip joint landmarks.

Step 1. Created a right Iliac Crest landmark.

Workspace | Signals and Events | Models | Reports | CalT

Segments | Landmarks | Muscles | Subject Data / Metrics

Landmarks | Functional | Digitizing

Landmark Name: RT_ILIAC

Define Orientation Using:

Starting Point: RIGHT_HIP (Reference)

☐ Targets and/or Landmarks:

Ending Point: (On a line)

*Lateral object: (On a plane)

*Project From: (Projection onto a line or plane)

* = Optional

☒ Existing Segment: LAB

Landmark Offset from Start Point (Reference) or Segment Origin

☐ Offset to Existing Calibration Target or Landmark

☒ Offset Using the Following ML/AP/AXIAL Offsets

X: 0.0

Y: 0.0

Z: ASIS_DISTANCE

☐ Offset by Percent (1.0 = 100%) (Meters when not checked)

☒ Calibration Only Landmark (Not generated for assigned motion file(s))

Undo Changes | Apply | Build Model | Close Tab

NOTE: The Z edit box contains the subject metric **0.5*ASIS_DISTANCE** as there are no strict dimensions, but it is convenient to base it partly on the subject's size. This will end up being the length of a virtual pelvis segment but will not be used for any inverse dynamics calculations, so the distance does not actually matter because only the orientation of the segment coordinate system will be used for segment and joint angles.

Step 2. Create a left iliac crest landmark.

Workspace | Signals and Events | Models | Reports | CalT

Segments | Landmarks | Muscles | Subject Data / Metrics

Landmarks | Functional | Digitizing

Landmark Name:

Define Orientation Using:

Starting Point: (Reference)

☐ Targets and/or Landmarks:

Ending Point: (On a line)

*Lateral object: (On a plane)

*Project From: (Projection onto a line or plane)

* = Optional

☒ Existing Segment:

Landmark Offset from Start Point (Reference) or Segment Origin

☐ Offset to Existing Calibration Target or Landmark:

☒ Offset Using the Following ML/AP/AXIAL Offsets

X:

Y:

Z:

☐ Offset by Percent (1.0 = 100%) (Meters when not checked)

☒ Calibration Only Landmark (Not generated for assigned motion file(s))

Undo Changes | Apply | Build Model | Close Tab

Segment Definition

We will now use the landmarks created above to define our virtual pelvis segment.

Step 3. Create a kinematic-only segment named RPV_2.

Segments | Segment Properties | IK Constraints

Segment Name:

☒ Kinematic Only

Segment Type:

Create

Step 4. Define the new pelvis segment as having:

1. its proximal end at the midpoint of the iliac crest landmarks defined above;
2. its distal end at the midpoint of the hip joint centre landmarks; and
3. using the same pelvis tracking markers as the original pelvis (LASI, RASI, SACR for a Coda pelvis).

Segments
Segment Properties
IK Constraints
RPV_2

Define Proximal Joint and Radius

Lateral
Joint
Medial
Radius (Meters)

RT_ILIAC
None
LT_ILIAC
0.10549

Define Distal Joint and Radius

Lateral
Joint
Medial
Radius (Meters)

RIGHT_HIP
None
LEFT_HIP
0.10549

Extra Target to Define Orientation (if needed)

Location
None

Select Tracking Targets (Ctrl-Left Mouse Click to Multiselect)

☐ Use Calibration Targets for Tracking

☐ RFRA
☐ RMP5
☐ RTIB
☒ SACR

☐ RHEE
☐ RMT1
☐ RTOE
☐ T10

☐ RKN2
☐ RMT5
☐ RUPA
☐ XIPH

☐ RKNE
☐ RSHO
☐ RWRA

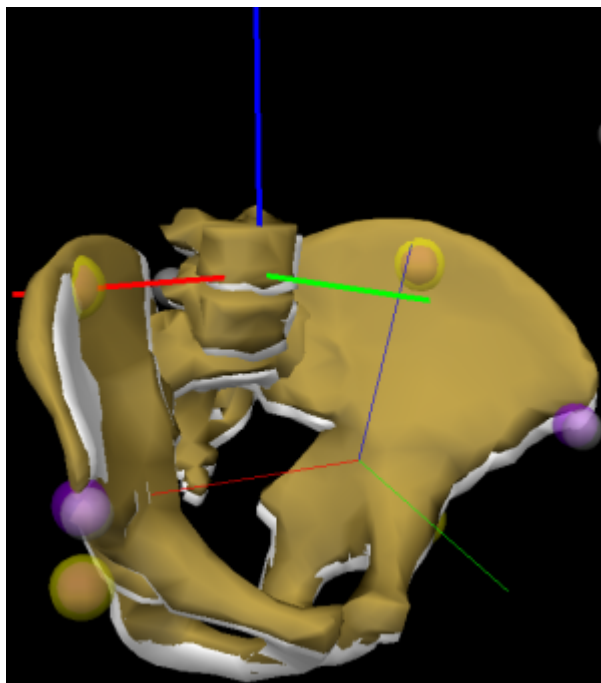
☐ RMP2
☐ RTHI
☐ RWRB

Depth (Meters): 0.12

Close Tab
Guess Properties
Apply
Build Model

Result

Your model now contains 2 pelvis segments named **Pelvis** and **RPV_2**. Pelvis segment RPV_2 has a z-axis that is now directed vertically upward, which means that its angle relative to the lab will have no anterior tilt.



The pelvis segment angle and hip joint angle can now be defined relative to segment RPV_2.

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