Validation of a FE- Foot Model with a Dummy Model

Wyss C.¹ and Heinlein B.²
Geometry from ISB Website

M, 26y, 630N, 180cm

• Scaling <> x-Ray
Determination of all muscle forces of the lower leg with AnyBody Version 5.2.0.

GaitLowerExtremityModel of Repository AMMRV1.4.1
Boundary conditions: Joint Loads = blue, Muscle and Reaction Forces = red
Simplifying the FE-Foot Model

FE Foot Model >> Simplification >> Metallic Dummy Model
Flexor group medial
Peroneus group lateral
Achilles Tendon
Ground reaction Force (with center of Force in the Forefoot)
Force Sensor
Weight = 282 kg

<table>
<thead>
<tr>
<th>Muscles</th>
<th>x</th>
<th>y</th>
<th>z</th>
<th>F_x</th>
<th>F_y</th>
<th>F_z</th>
</tr>
</thead>
<tbody>
<tr>
<td>gastrocnemius/soleus</td>
<td>-20.7</td>
<td>-11.2</td>
<td>32.9</td>
<td>651.5</td>
<td>2.3</td>
<td>1'372.3</td>
</tr>
<tr>
<td>FHL/FDL/TibPost</td>
<td>33.3</td>
<td>8.1</td>
<td>42.7</td>
<td>-64.5</td>
<td>93.3</td>
<td>396.6</td>
</tr>
<tr>
<td>peroneus longus</td>
<td>71.3</td>
<td>-32.1</td>
<td>13.4</td>
<td>-186.1</td>
<td>-7.1</td>
<td>198.5</td>
</tr>
<tr>
<td>Ground reaction Force</td>
<td>167.8</td>
<td>-1.8</td>
<td>13.4</td>
<td>0</td>
<td>0</td>
<td>536.1</td>
</tr>
</tbody>
</table>
Metallic Dummy Model

Determines Reaction Forces in z Direction

FE Model of the Dummy Model

Determines Reaction Forces and Moments in all Directions
Convergence of the Metallic Dummy Model and the FE-Dummy Model

16 Load Steps
No. 16 = nominal Load

Blue = Applied Force on Metallic Model
Red = Simulation from FE-Dummy-Model
FE Foot Model

Validation Model

Z direction

X and Y direction
Results