PEDESTRIAN PROTECTION
LOWER LEG OBLIQUE IMPACT

COMPARISON OF THUMS VS. FLEXPLI CRUCIATE LIGAMENTS – ACL, PCL

EG-82, 28.08.2014
PEDESTRIAN PROTECTION
LOWER LEG OBLIQUE IMPACT

Setup of comparison

• same vehicle front
• impact at centre of vehicle (Y = 0)
• impact at test conditions (v = 40 km/h)
• variation of impact angle (rotation of vehicle)

• FlexPLI curves in red
• THUMS curves in green
PEDESTRIAN PROTECTION
LOWER LEG OBLIQUE IMPACT

Impact angle = 0°
PEDESTRIAN PROTECTION
LOWER LEG OBLIQUE IMPACT

Impact angle = 30°
PEDESTRIAN PROTECTION
LOWER LEG OBLIQUE IMPACT

Impact angle = 45°
PEDESTRIAN PROTECTION
LOWER LEG OBLIQUE IMPACT

ACL – elongation: impact direction comparison – 0° to 30°

FlexPLI
THUMS
PEDESTRIAN PROTECTION
LOWER LEG OBLIQUE IMPACT

ACL – elongation: impact direction comparison – 25 to 45°
PEDESTRIAN PROTECTION
LOWER LEG OBLIQUE IMPACT

PCL – elongation: impact direction comparison – $0^\circ$ to $30^\circ$

FlexPLI
THUMS
PEDESTRIAN PROTECTION
LOWER LEG OBLIQUE IMPACT

PCL – elongation: impact direction comparison – 25° to 45°
Conclusion

• FlexPLI overestimates the elongation of ACL and PCL, despite the curve progression seems to be comparable at lower surface angles (<30°) in most cases.

• PCL behaviour between FlexPLI and THUMS model seems not to be correlated.

• This may be reasoned by the different arrangement of the cruciate ligaments at THUMS in comparison to the FlexPLI.

• Further investigation seems to be necessary
Thank you for your attention!