

PEDESTRIAN PROTECTION LOWER LEG OBLIQUE IMPACT

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

EG-82, 28.08.2014

**BMW
GROUP**



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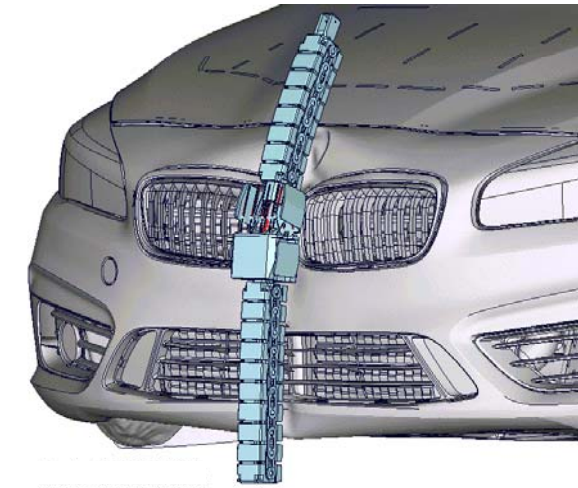
Setup of comparison

- 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

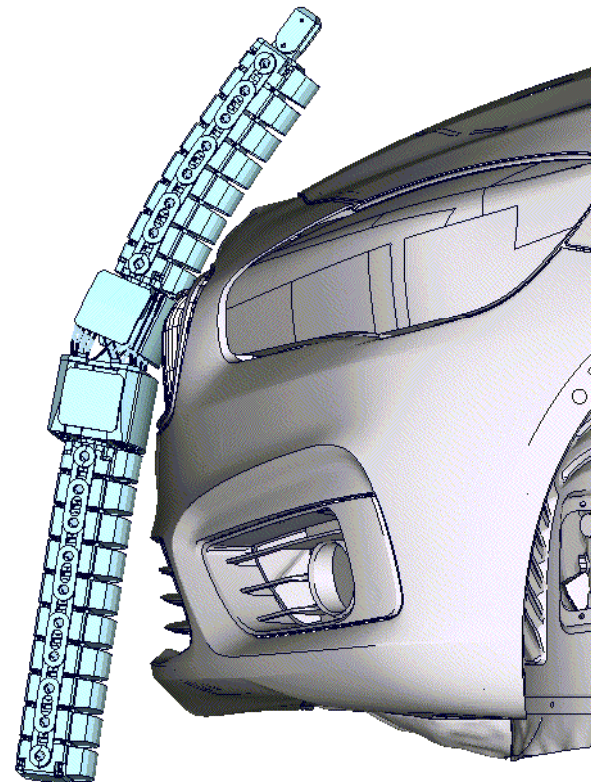
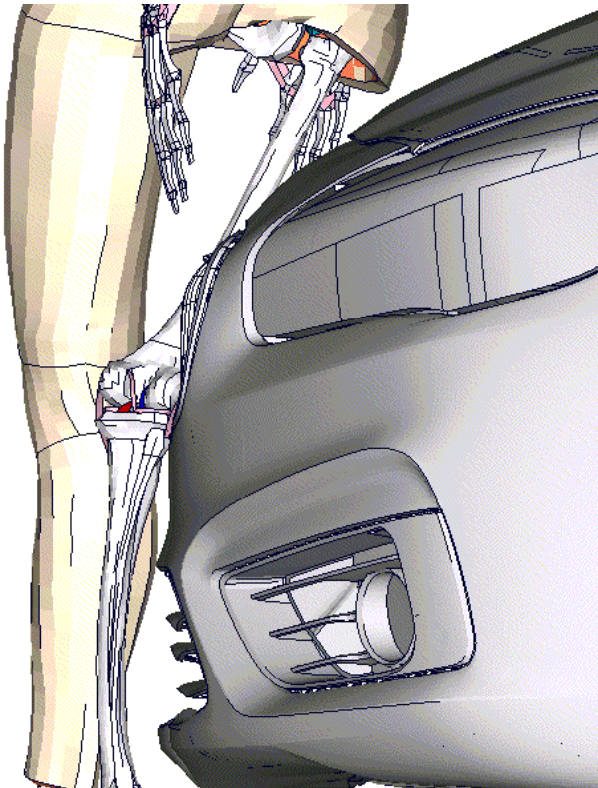
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Impact angle = 0°



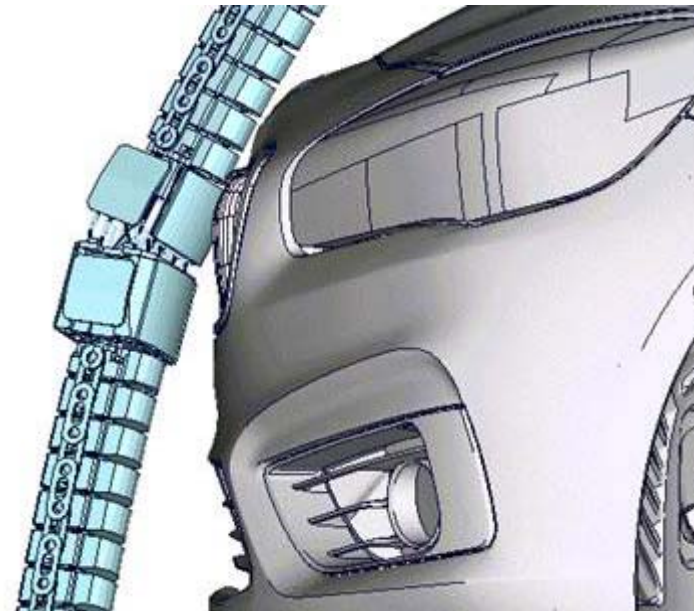
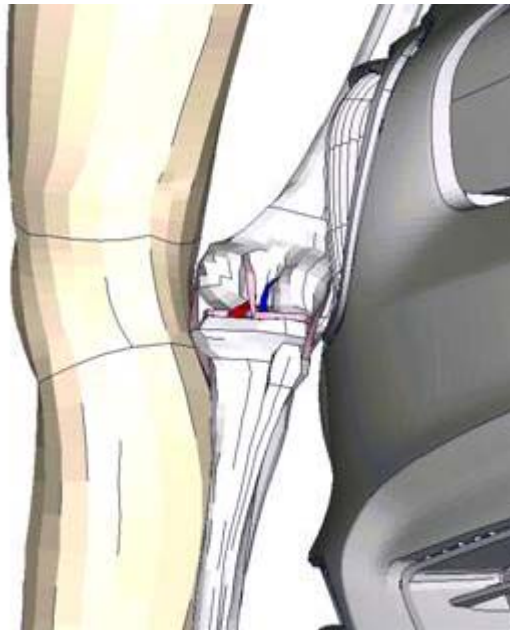
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Impact angle = 30°



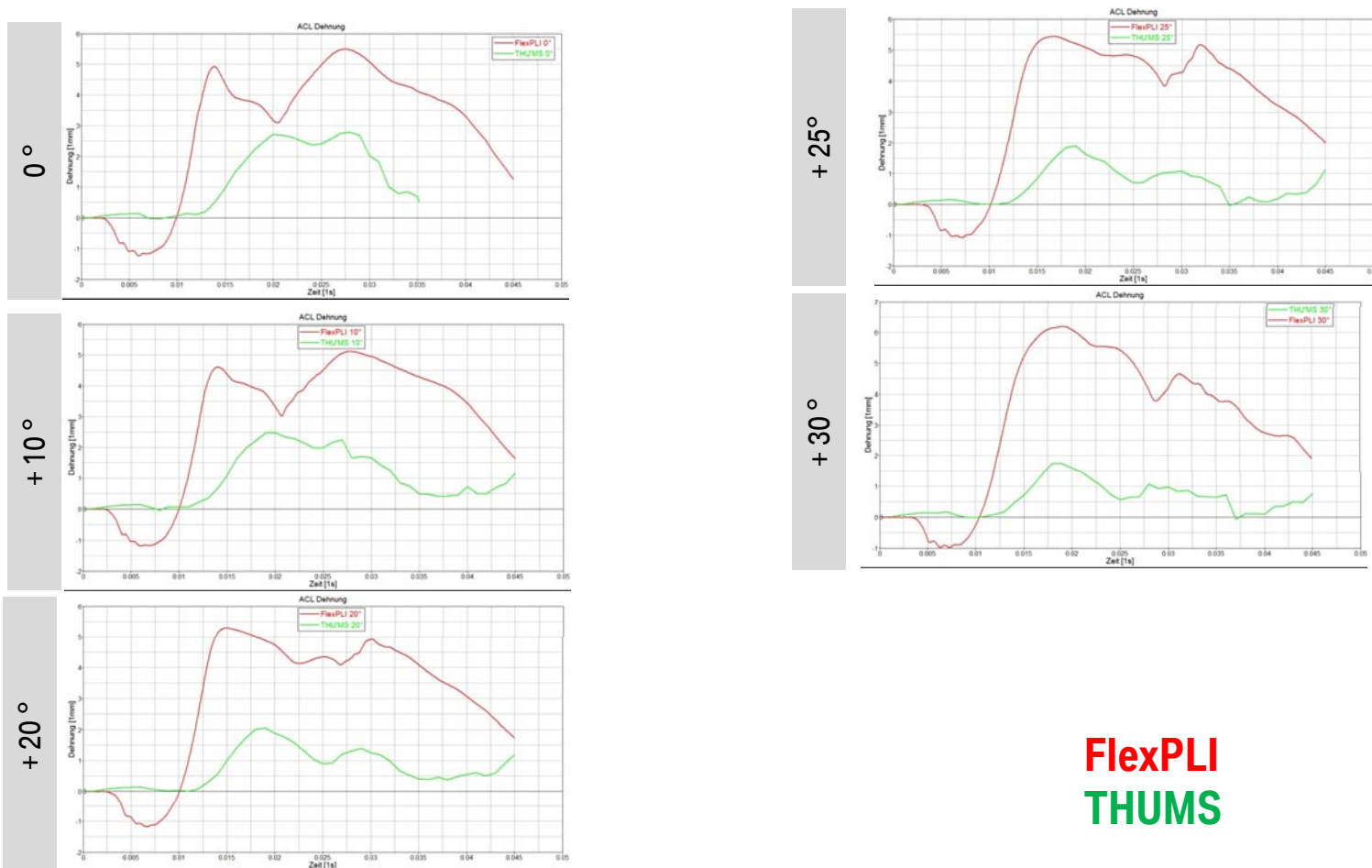
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Impact angle = 45°



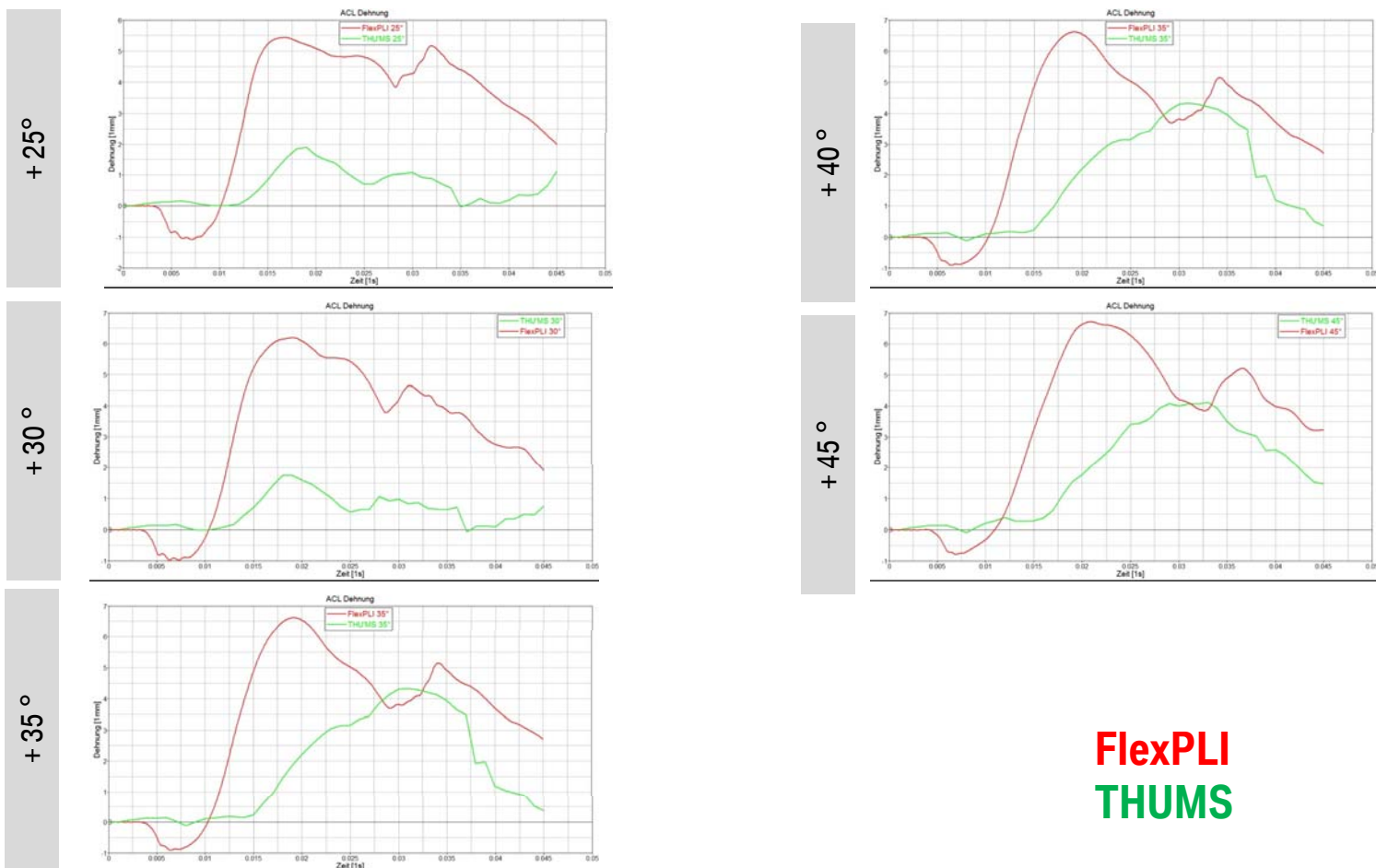
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ACL – elongation: impact direction comparison – 0° to 30°



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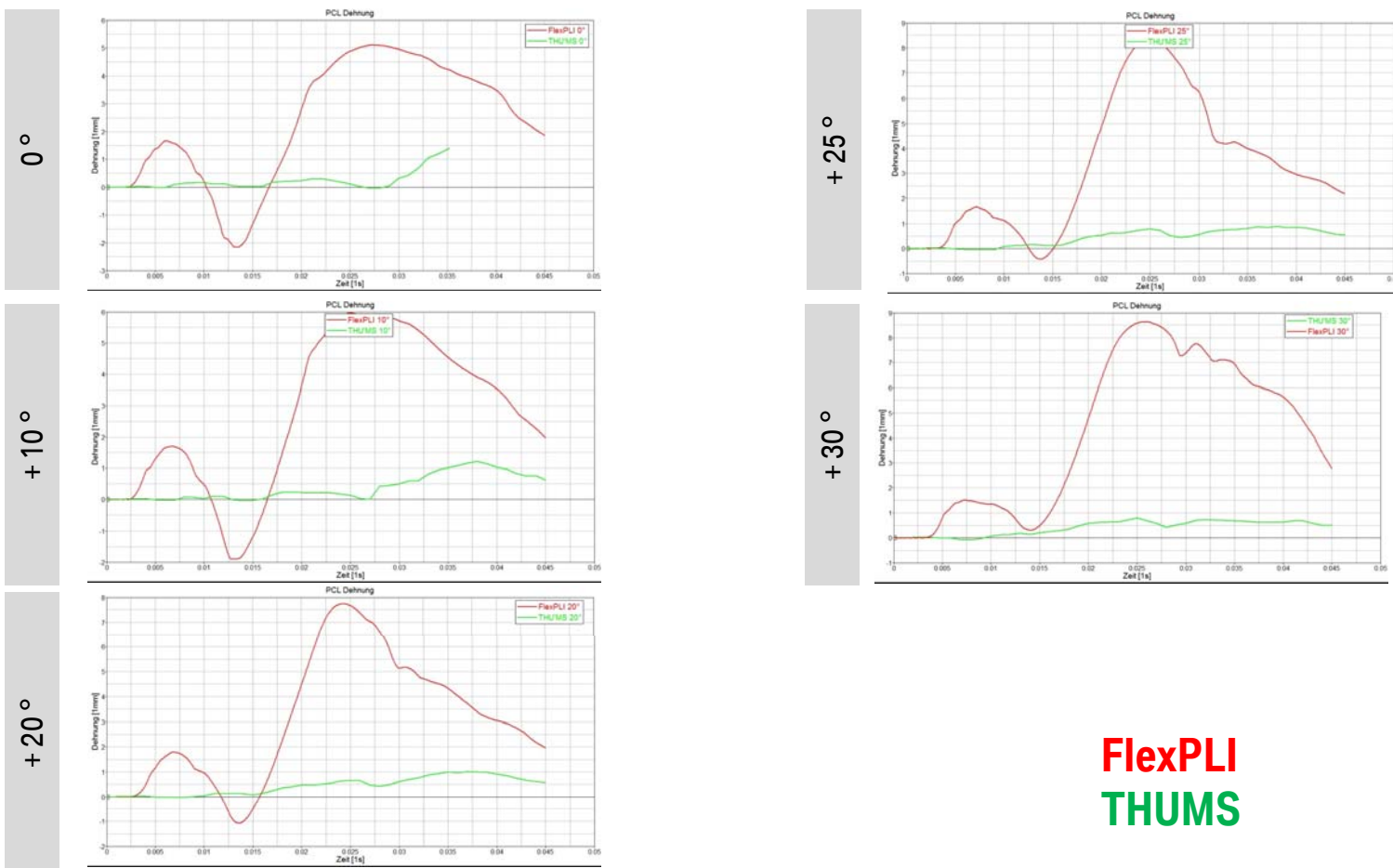
ACL – elongation: impact direction comparison – 25 to 45 °



FlexPLI
THUMS

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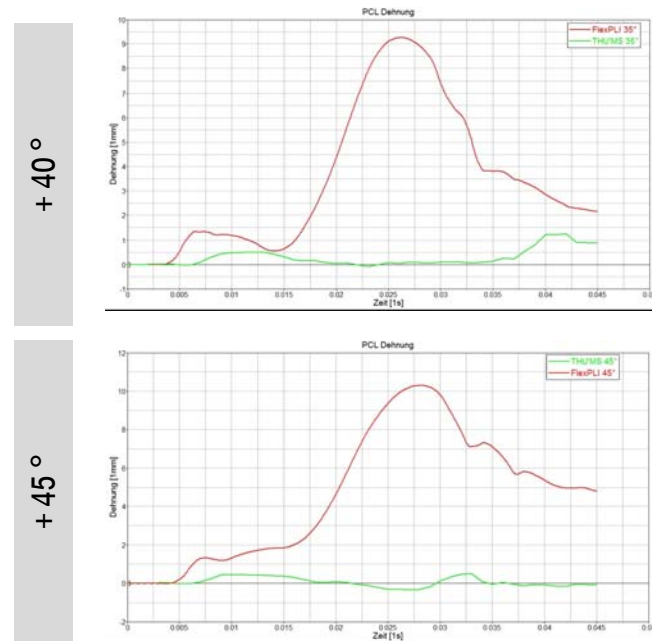
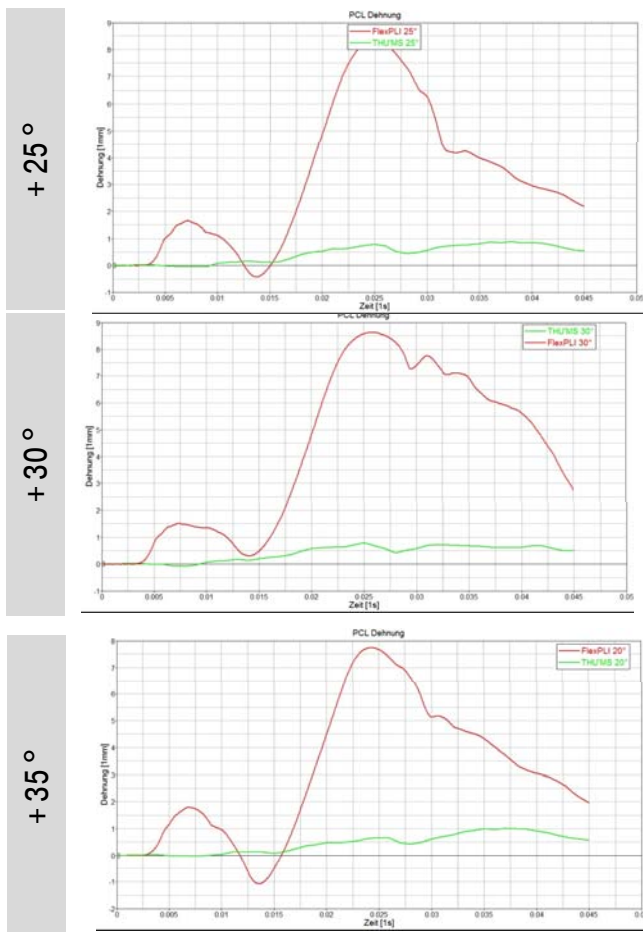
PCL – elongation: impact direction comparison – 0° to 30°



FlexPLI
THUMS

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



FlexPLI
THUMS

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Conclusion

- FlexPLI overestimates the elongation of ACL and PCL, despite the curve progression seems to be comparable at lower surface angles ($< 30^\circ$) 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

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Thank you for your attention!