Oblique Testing with WorldSID, ES2-re, & PMHS

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Modular Scalable Load Wall
- For oblique side impact tests
- Region-specific responses
- Modular load wall design
- Dummy biofidelity issues

Oblique versus Pure Lateral Loading

Modular, Scalable Load Wall

WorldSID Alignment

Shoulder
Thorax
Abdomen
Pelvis (superior)
Pelvis (inferior)

Leg plate
Test Matrix and instrumentation
- Velocities: 3.3, 6.7, and 7.5 m/s
- WorldSID, ES2-re, & PMHS tests
- Repeated testing protocol used
- Triaxial load cells: STAPP plates
- Thorax & abdomen chestbands
- Region-specific ATD deflections
- Oblique and pure lateral output

Sled Pulse: 3.4, 6.7, and 7.5 m/s ΔV

Results: Chestband-based Data
- Effective peak deflections
- Effective peak angulations
- “IR-TRACC-type” peak deflections
- “Potentiometer-type” deflections
- Thoracic and abdominal regions

Results: Sensor-based Data
- The thoracic and abdominal regions
- Peak deflections from five II IR-TRACC
- Peak deflections from potentiometers
**Determination of Peak Deflections**

Temporal deflection at any point: $D_2 - D_1$

**Effective Peak Deflection**

**Effective Peak Angulation**

**“IR-TRACC-type” Deflections for WorldSID**

Based on chestband data

**“IR-TRACC-type” Angle for WorldSID**

Based on chestband data

**WorldSID Oblique Thorax Deflections**

Effective peak

Peak “IR-TRACC”

Low Med High
Multipoint Sensing – Chestband Data

Application – RibEye

Effective angulations from effective peak chest deflections

2D-IR-TRACC: Angular Measurements

Effective angulations from “2D-IR-TRACC-type” peak deflections

Summary

- Region-specific responses
  - Both ATD: effective in sensing the pure lateral loads
  - Both ATD: peak deflections in oblique < pure lateral
  - WorldSID better sensed oblique loading than ES2-re
  - WorldSID suitable both oblique/pure lateral impacts

- Current 1D IR-TRACC sensor location
  - Replicates pure lateral response well
  - Less than optimal for oblique loading

- 2D IR-TRACC use and implications
- Optical sensors may also be used
- Injury criteria for oblique loading

Thank You

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