

2019 Generic Tractor Automated Driving System (ADS) Vehicle

Finite Element Model Development

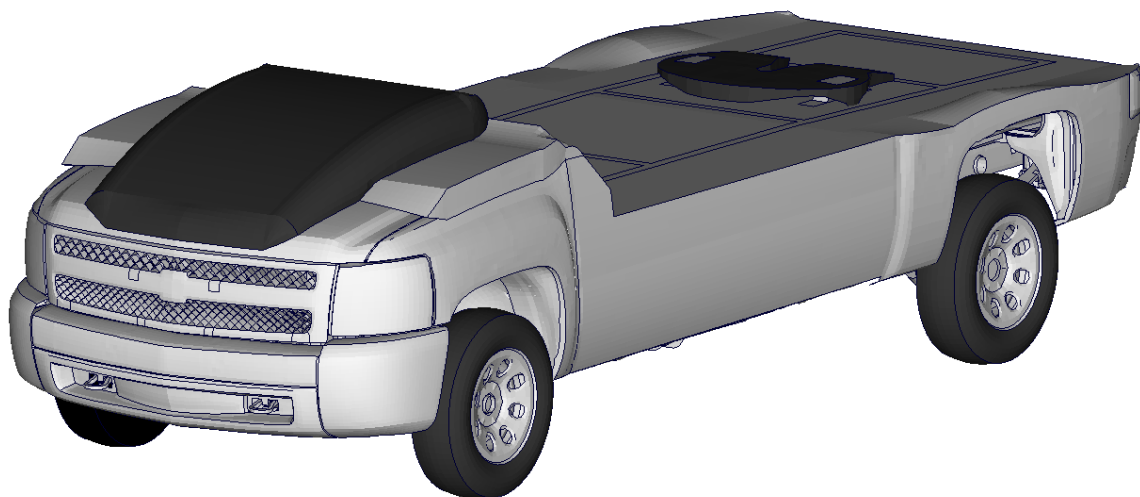


DOI: 10.13021/cbhm-b183

Vehicle Description

- GMU-CCSA-GENERIC-Tractor-ADS-VEHICLE-V1.key
- Tractor Automated Driving System (ADS) Vehicle
- Weight: 3373 kg
- Finite element model derived from a validated 2014 Chevrolet Silverado FE model (doi:10.13021/p6mn-hp79)
- Dimensions similar to existing tractor ADS vehicle concepts
- Resulting tractor ADS vehicle FE model was NOT validated against test data

Model Information



Number of parts	400
Number of nodes	192049
Number of solid elements	4899
Number of shell elements	301752
Number of beam elements	1515
Number of elements	308166
Model units	mm, s, t, N
Release date	Nov. 2019

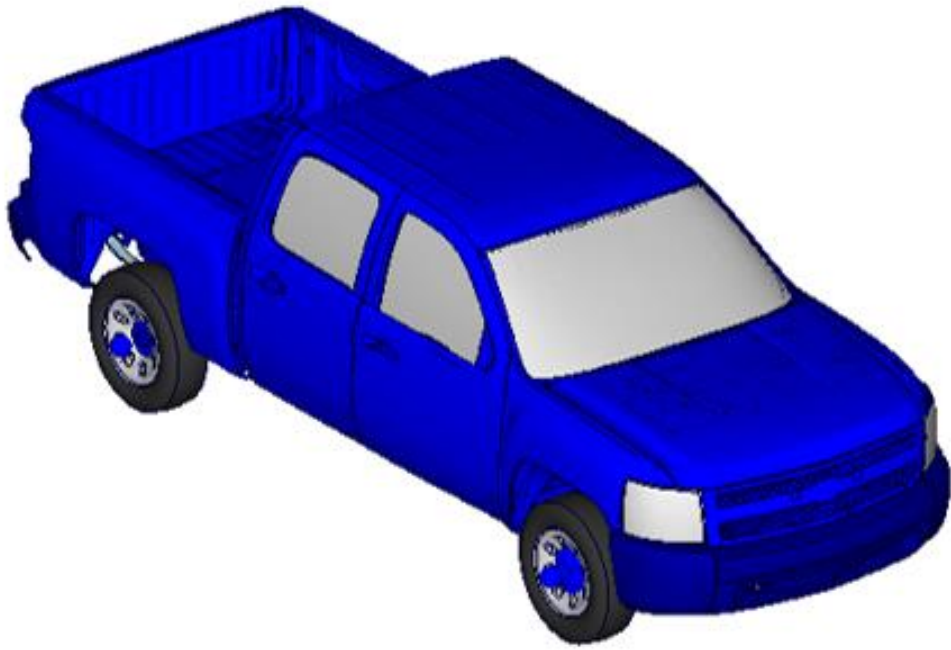
Example of an existing tractor ADS vehicle concept



www.volvotrucks.com/en-en/about-us/automation/vera.html



Model Development

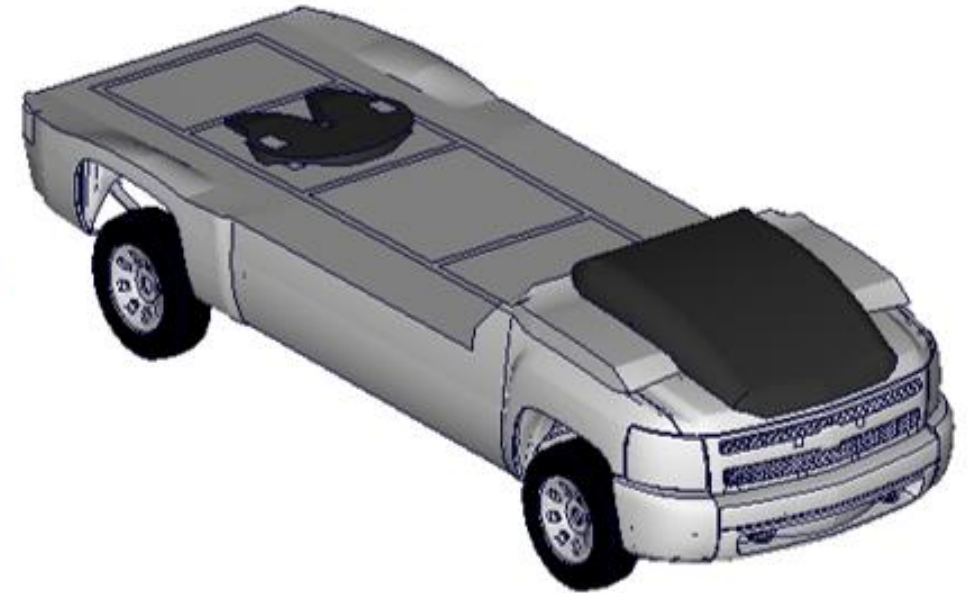


Existing FE Model

Remove engine,
cabin, and bed



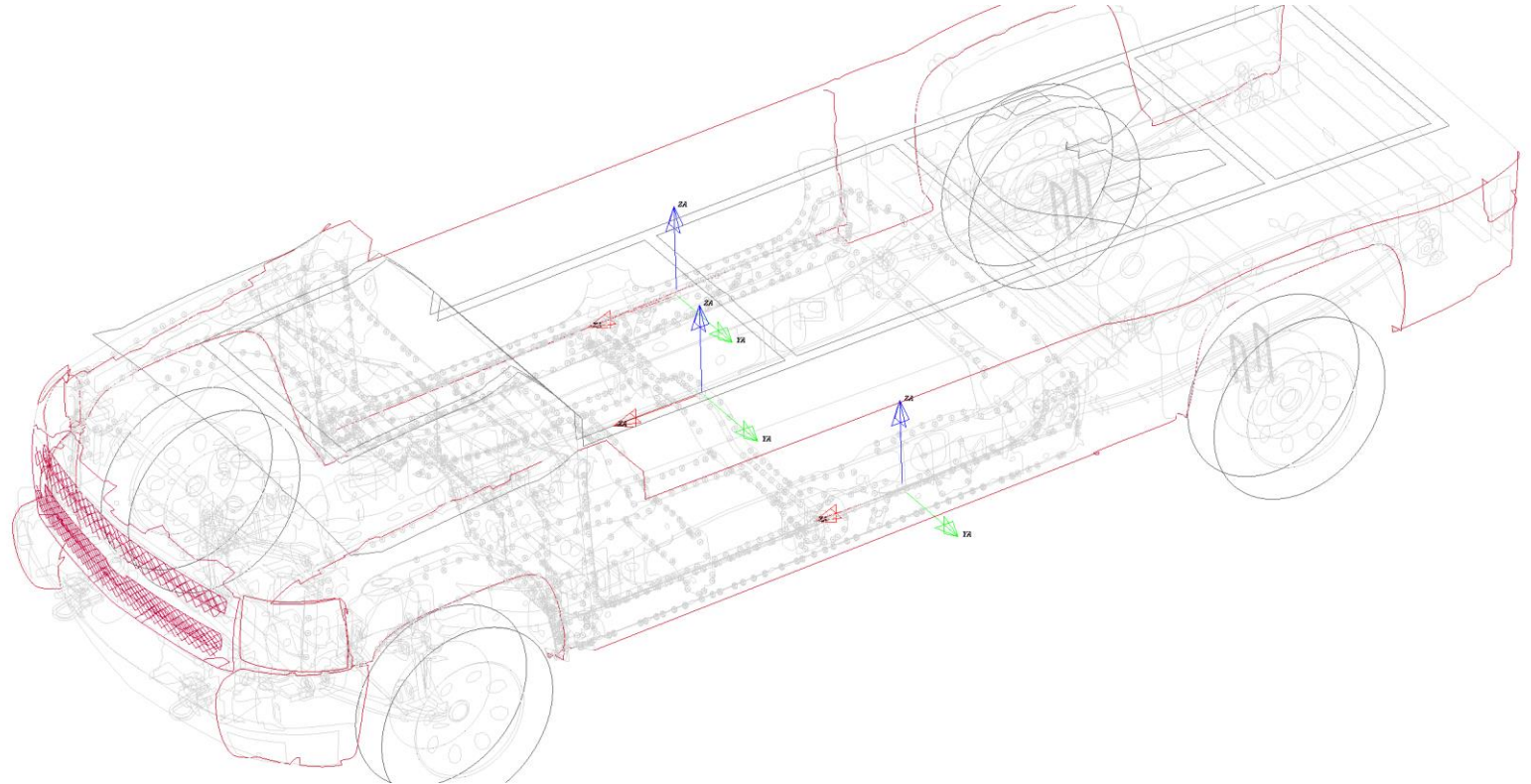
Add battery
and motor



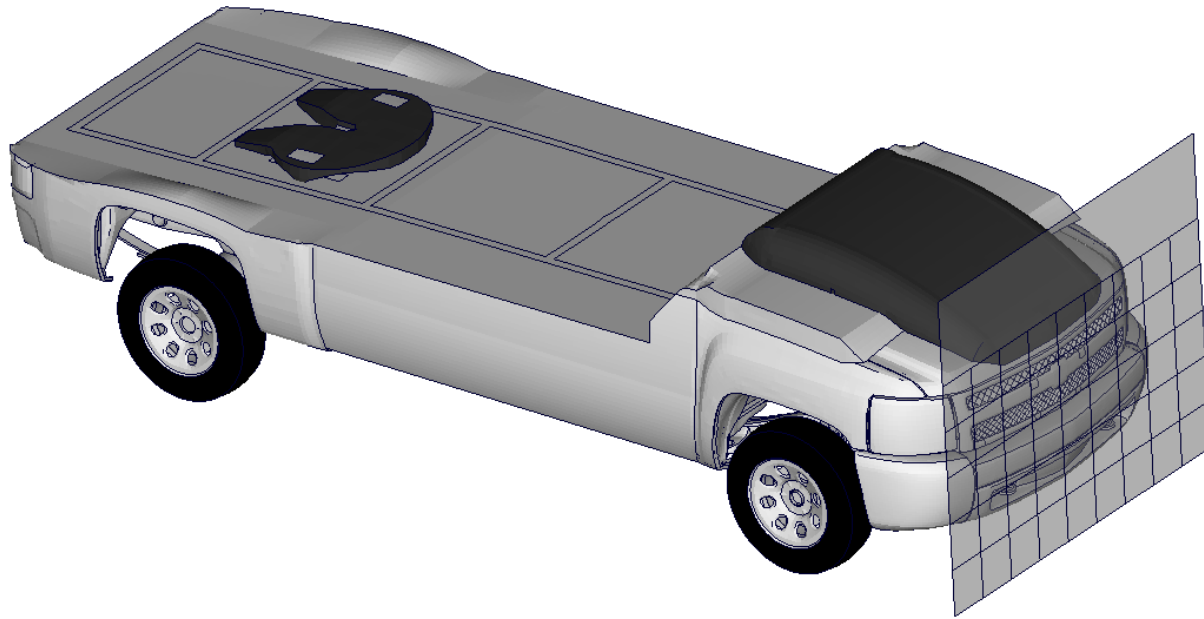
Generic Tractor ADS FE Model

Accelerometers

- Left Rear Seat (Node 1167327)
- Right Rear Seat (Node 1167319)
- Vehicle C.G. Local (Node 1167332)
- Vehicle C.G. Global (Node 1167338)

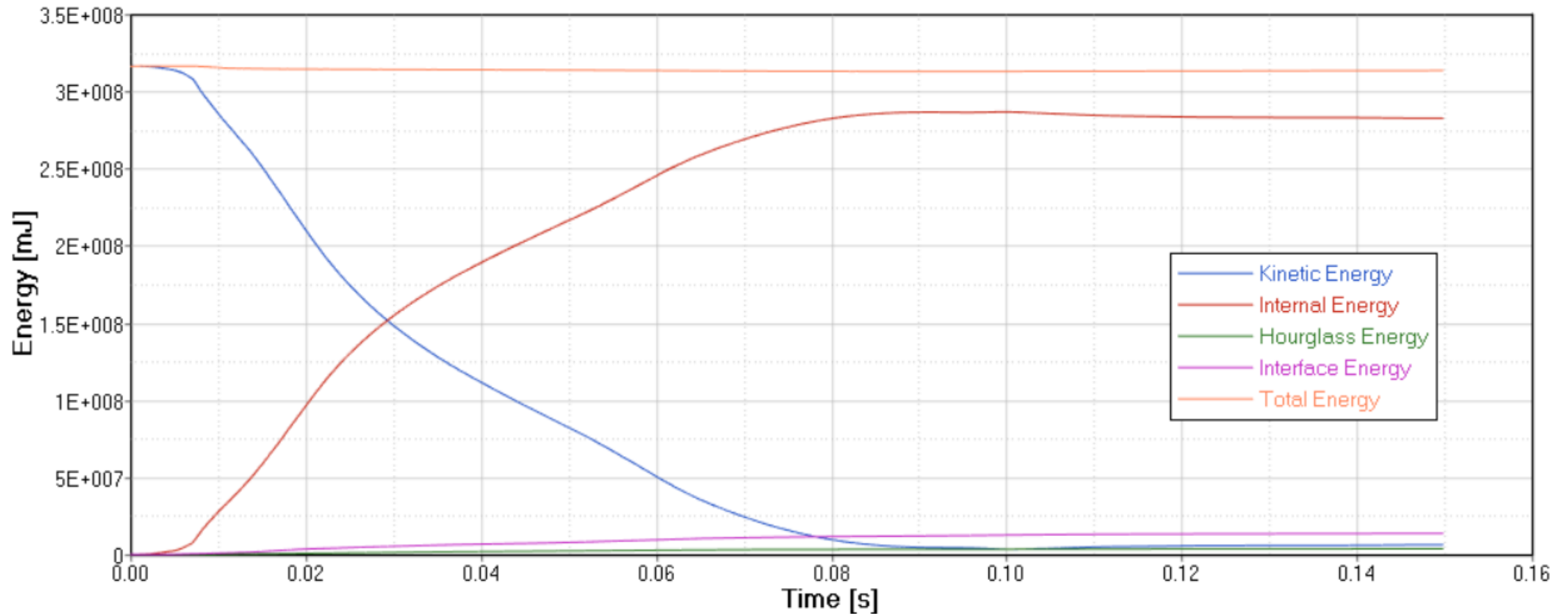


Simulation Benchmark

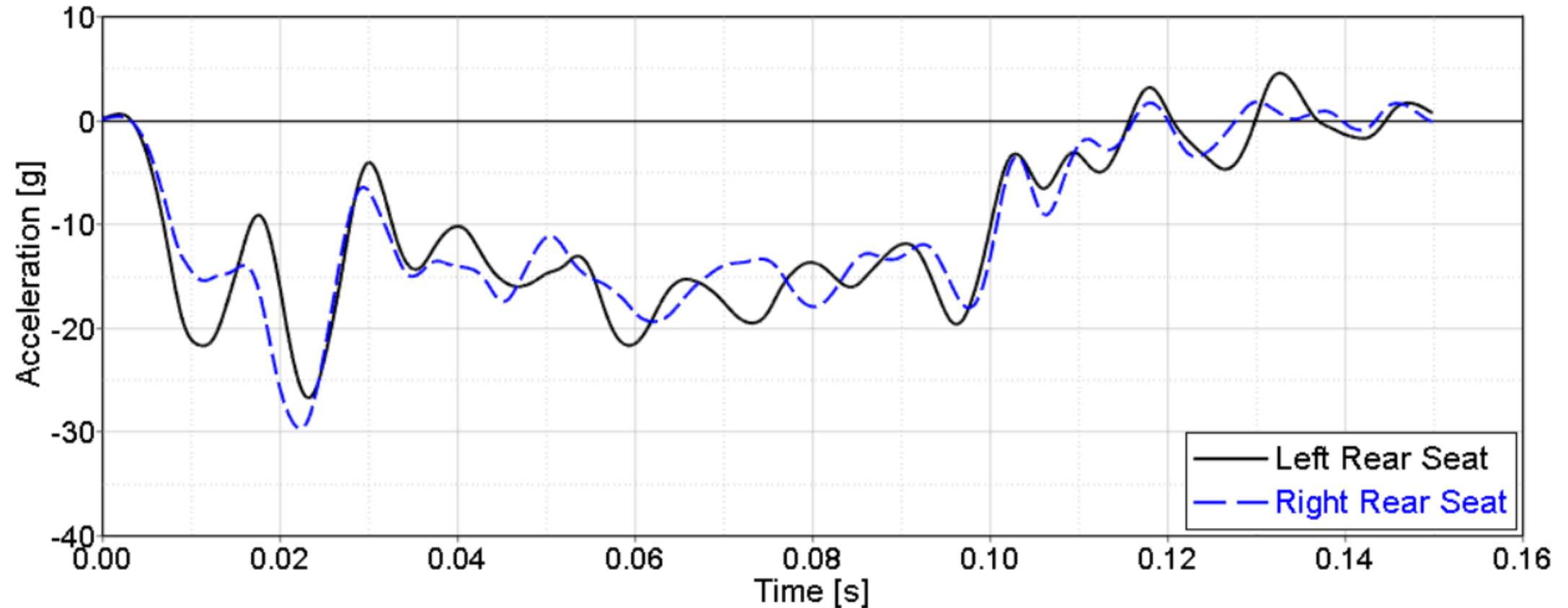


LS-DYNA	
Platform	Linux RHEL 5.4
Version	MPP s R9.3.0
Revision	128342
Precision	Single precision (I4R4)
Turn around time (150ms)	38 minutes
Number of processors	16

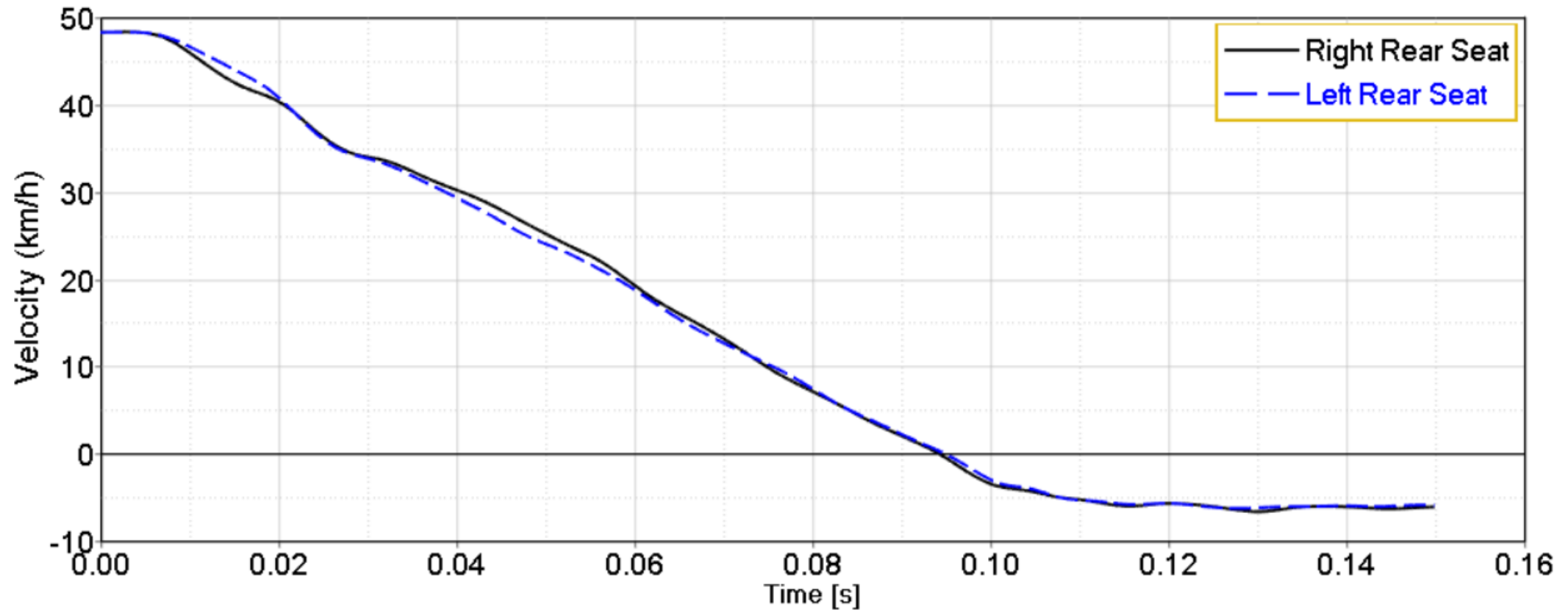
Full Frontal Impact – 48 km/h – Energy Summary



Full Frontal Impact – 48 km/h – X-Acceleration



Full Frontal Impact – 48 km/h – X-Velocity



Full Frontal Impact – 48 km/h – Force vs. Displacement

