Supplementary Material

Demystifying the Data Need of ML-surrogates for CFD Simulations

December 15, 2021

Abstract

This document contains zoomed-in visualization of Figure 3 in the main manuscript and additional information about the training procedure.

Zoomed-in Figures

Figures 1-24 demonstrate the zoomed-in visualization of ground-truth and the prediction from one training data size. The left part of each figure is the ground truth and the right part denotes the prediction.

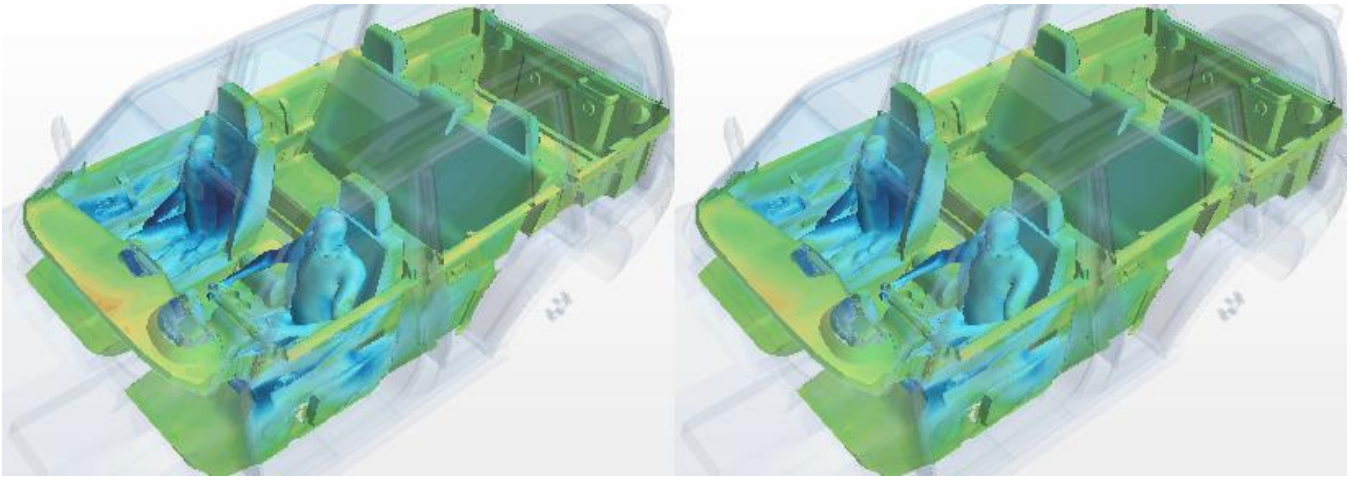


Figure 1: Zoomed-in view of Figure 3(a) of the Main Submission: Ground truth vs. Training from 50

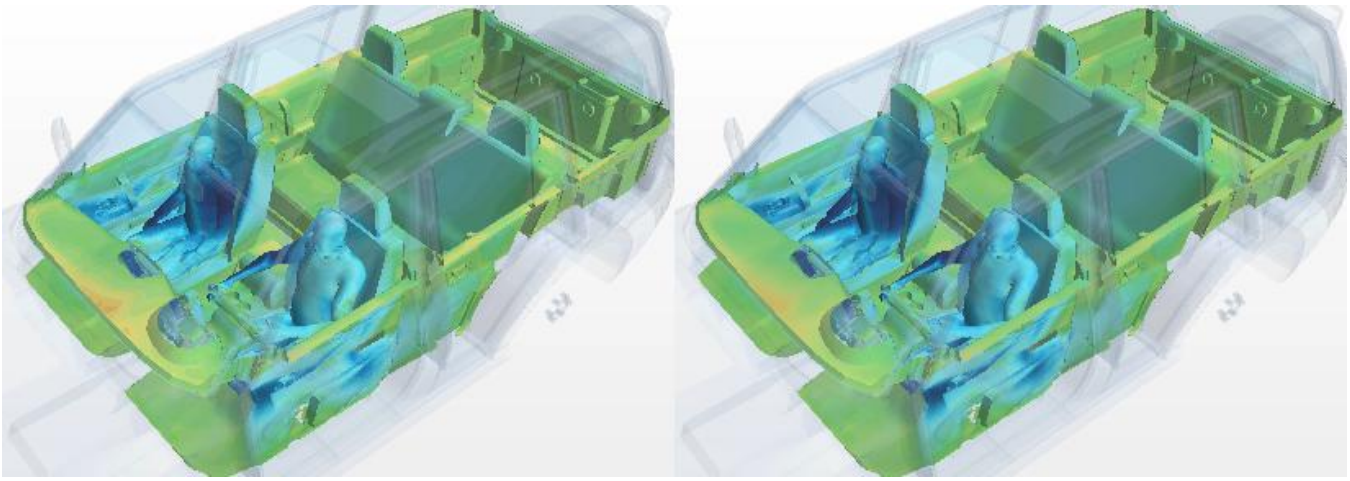


Figure 2: Zoomed-in view of Figure 3(a) of the Main Submission: Ground truth vs. Training from 100

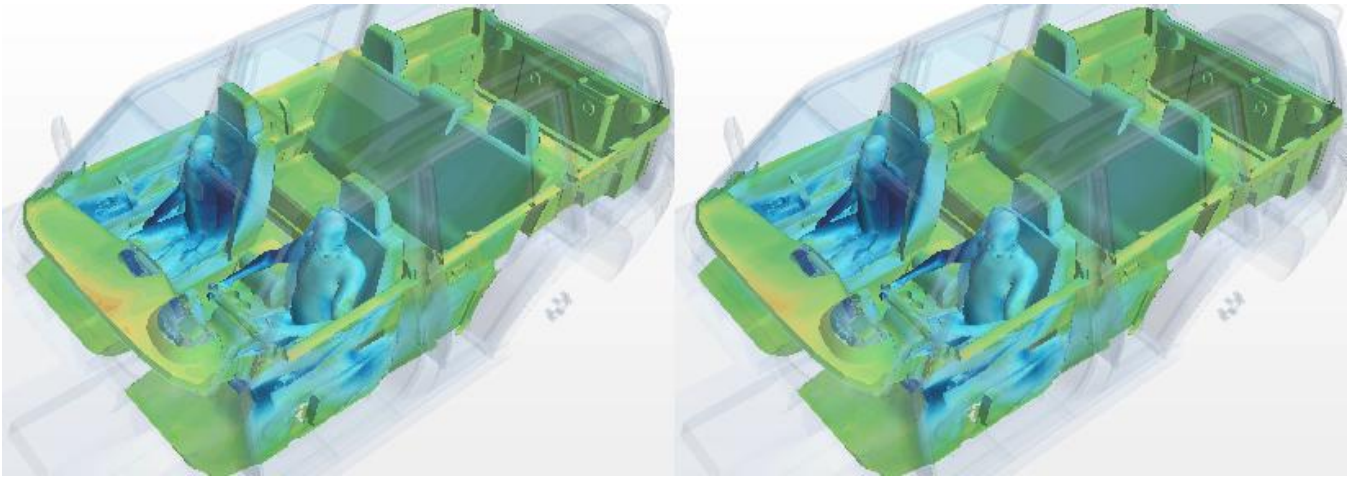


Figure 3: Zoomed-in view of Figure 3(a) of the Main Submission: Ground truth vs. Training from 150

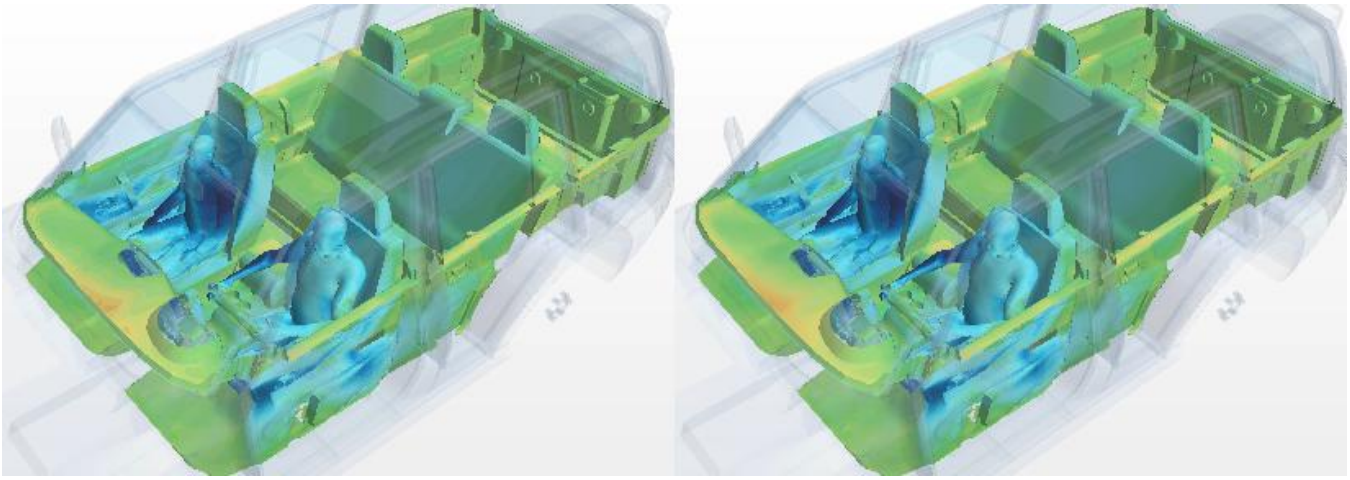


Figure 4: Zoomed-in view of Figure 3(a) of the Main Submission: Ground truth vs. Training from 200

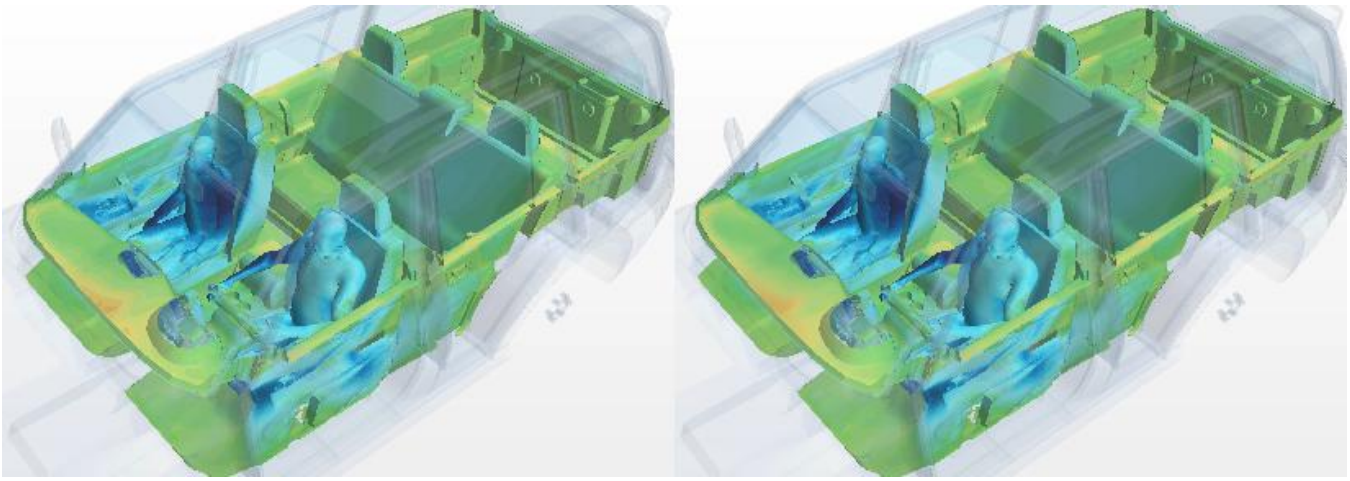


Figure 5: Zoomed-in view of Figure 3(a) of the Main Submission: Ground truth vs. Training from 500

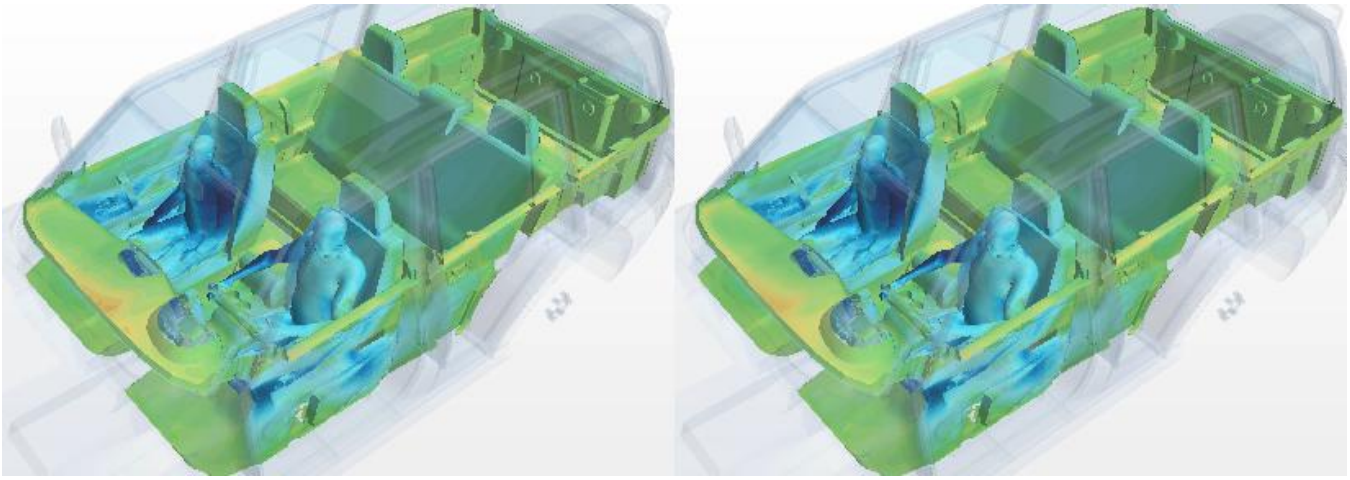


Figure 6: Zoomed-in view of Figure 3(a) of the Main Submission: Ground truth vs. Training from 1000

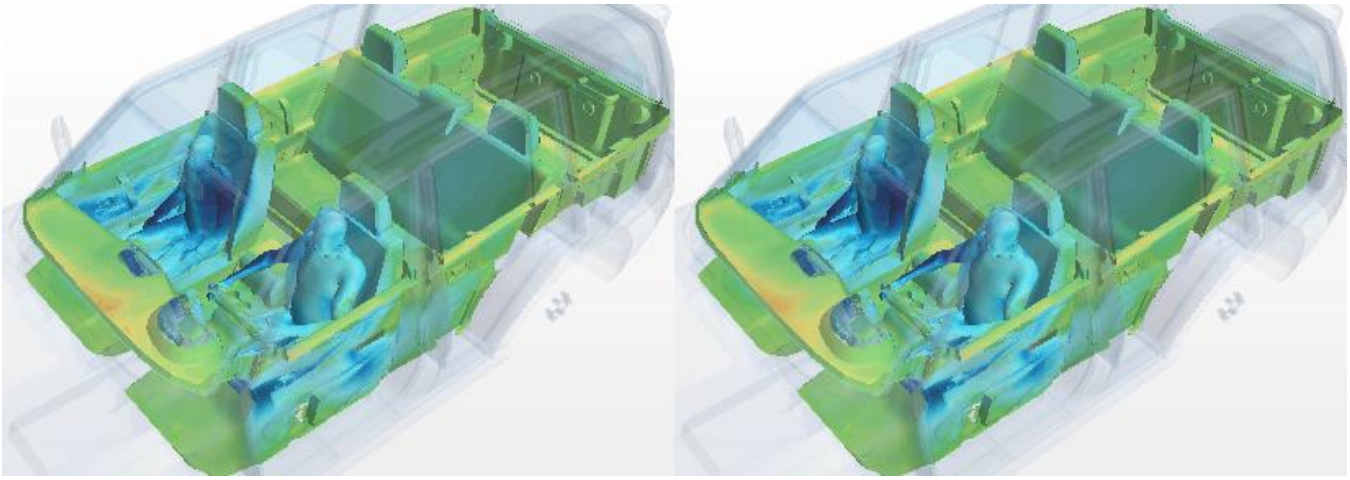


Figure 7: Zoomed-in view of Figure 3(a) of the Main Submission: Ground truth vs. Training from 1500

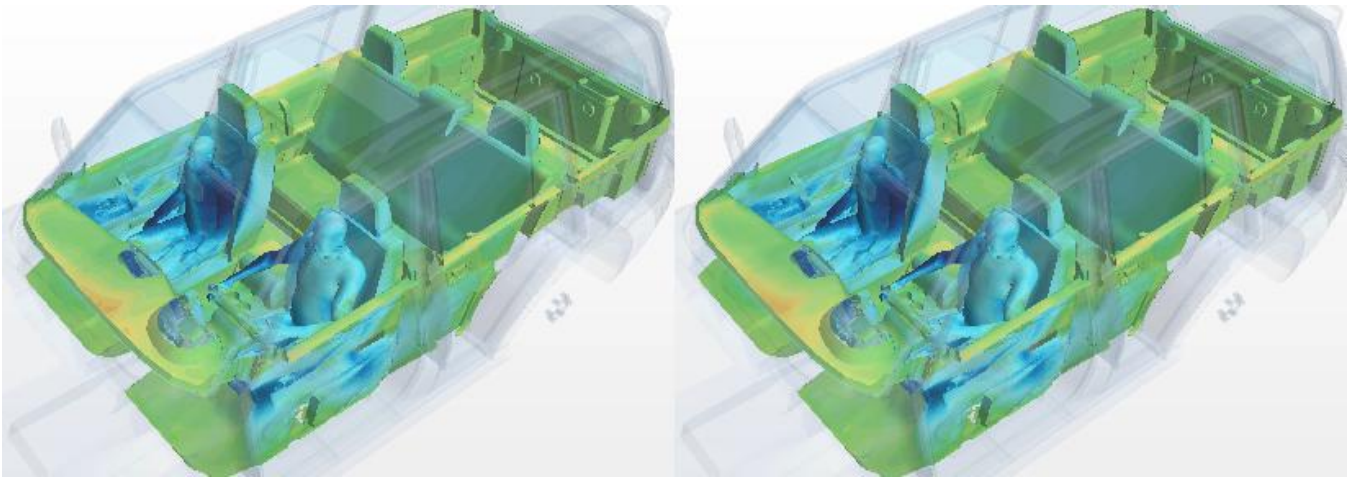


Figure 8: Zoomed-in view of Figure 3(a) of the Main Submission: Ground truth vs. Training from 2000

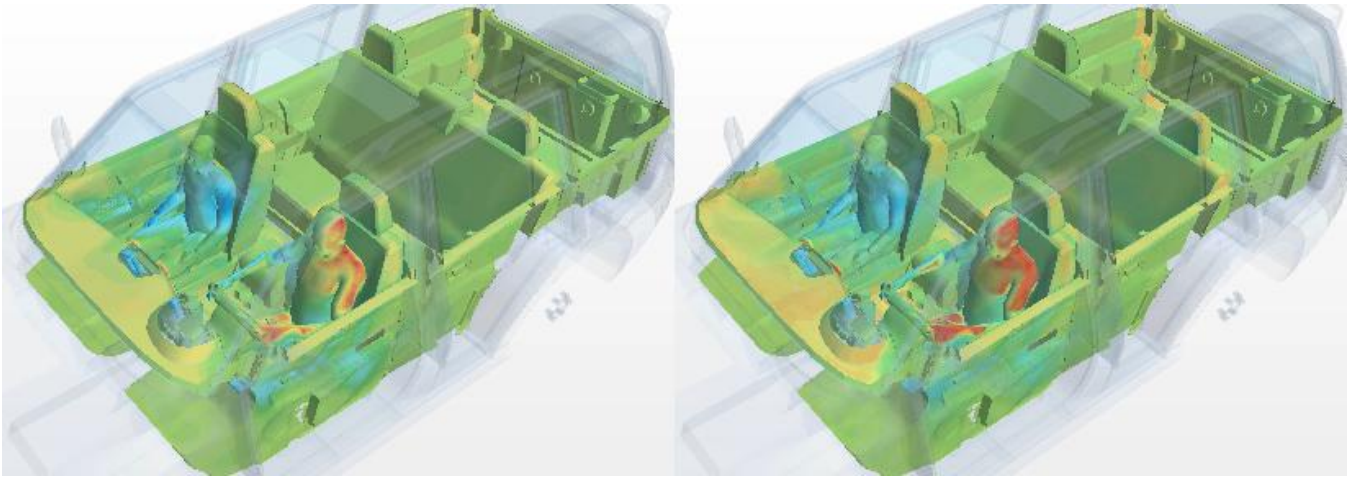


Figure 9: Zoomed-in view of Figure 3(b) of the Main Submission: Ground truth vs. Training from 50

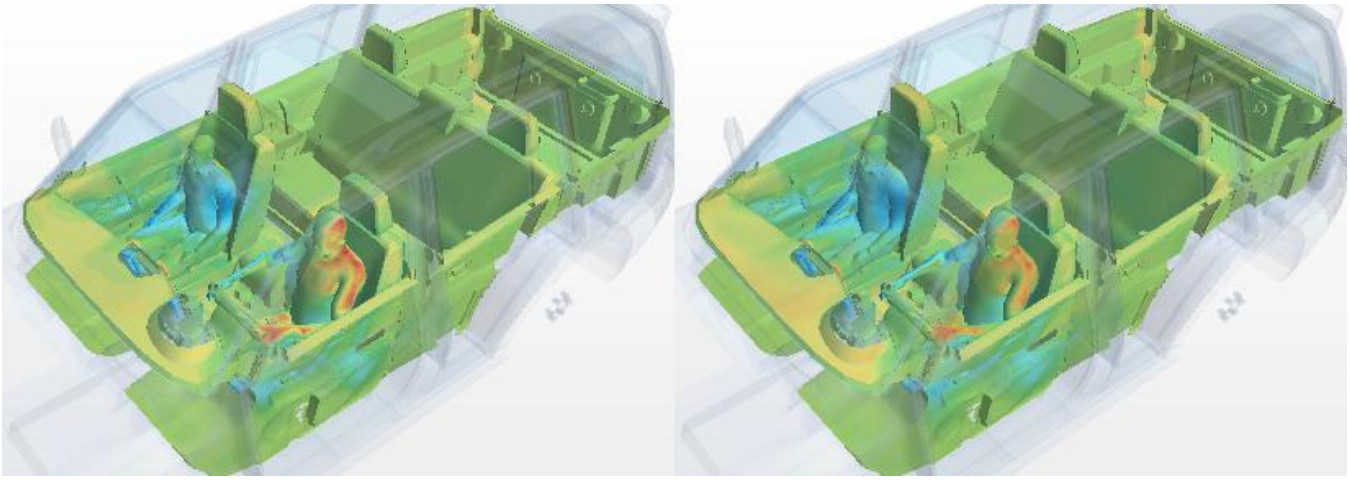


Figure 10: Zoomed-in view of Figure 3(b) of the Main Submission: Ground truth vs. Training from 100

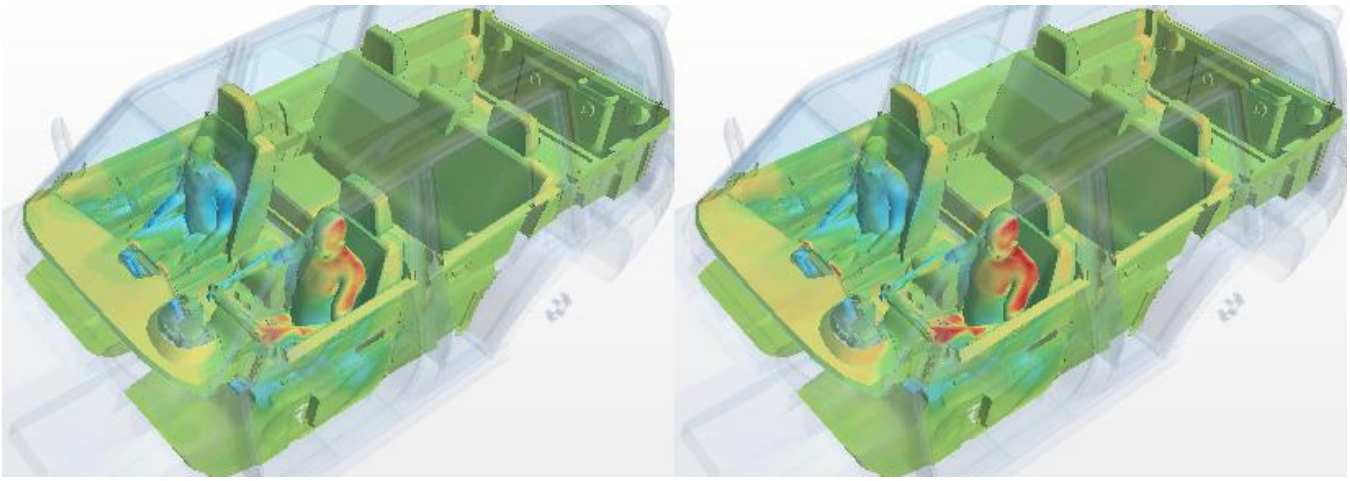


Figure 11: Zoomed-in view of Figure 3(b) of the Main Submission: Ground truth vs. Training from 150

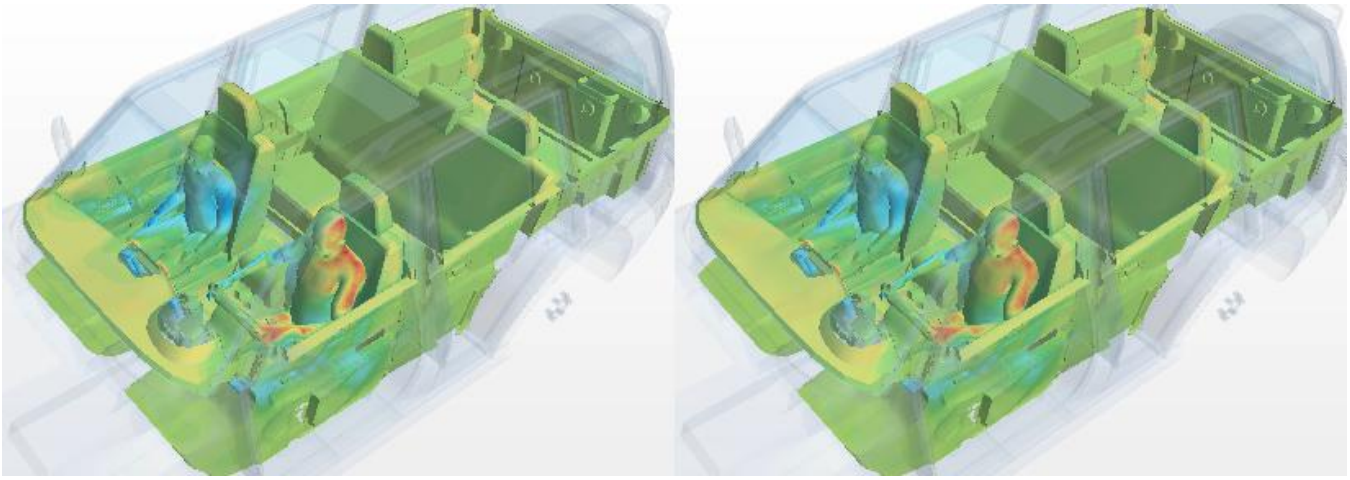


Figure 12: Zoomed-in view of Figure 3(b) of the Main Submission: Ground truth vs. Training from 200

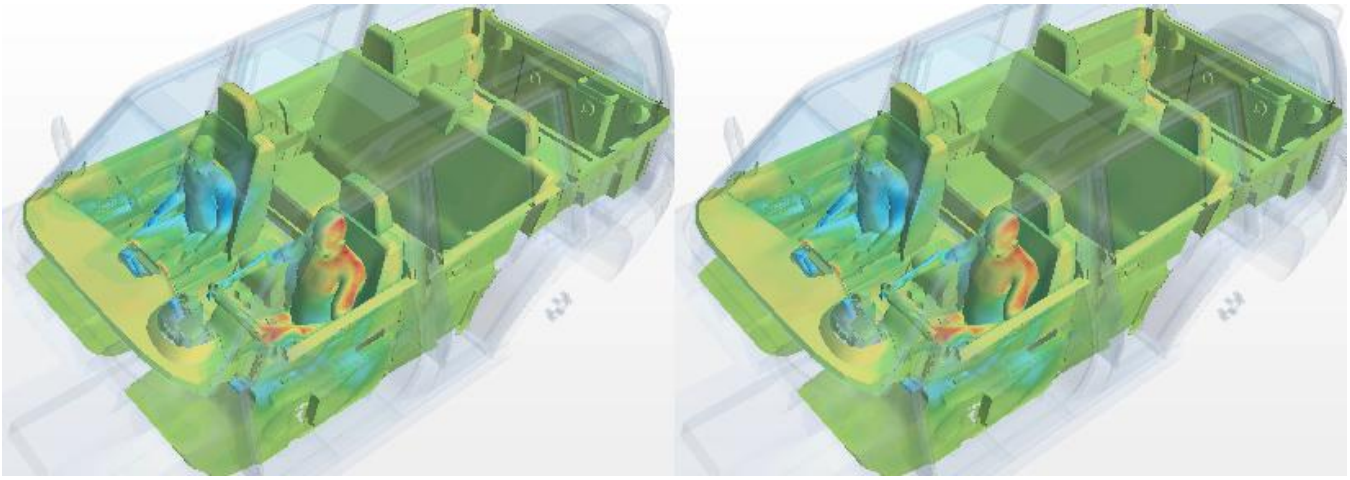


Figure 13: Zoomed-in view of Figure 3(b) of the Main Submission: Ground truth vs. Training from 500

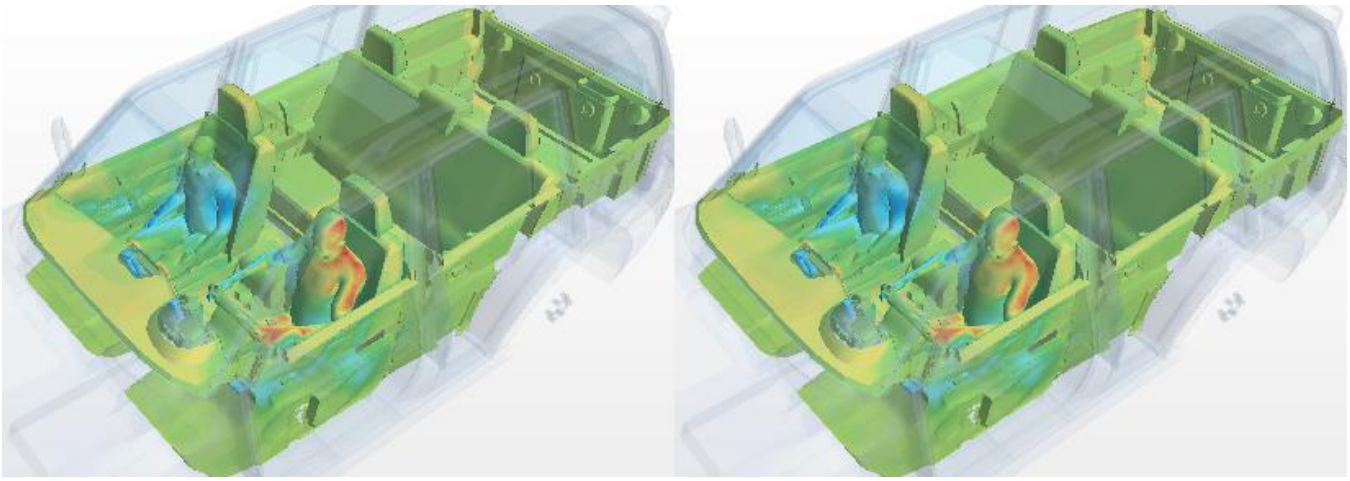


Figure 14: Zoomed-in view of Figure 3(b) of the Main Submission: Ground truth vs. Training from 1000

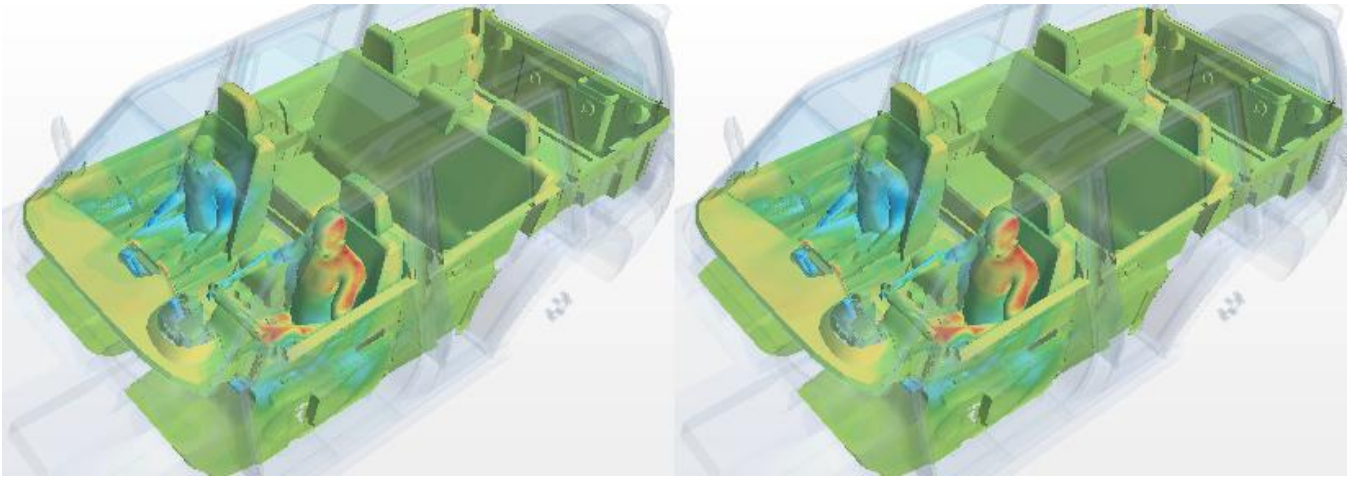


Figure 15: Zoomed-in view of Figure 3(b) of the Main Submission: Ground truth vs. Training from 1500

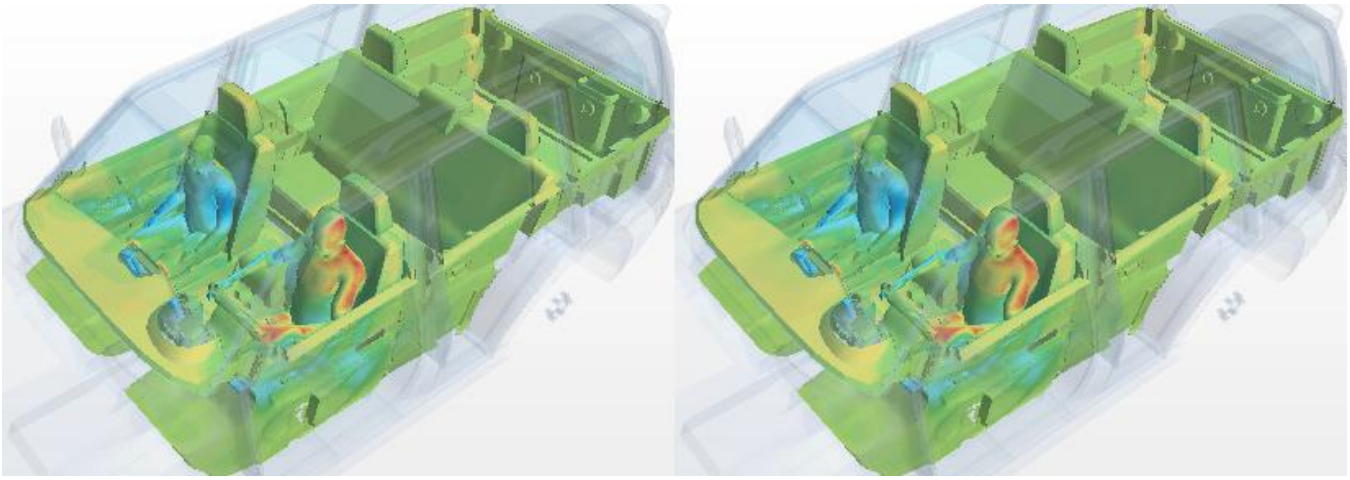


Figure 16: Zoomed-in view of Figure 3(b) of the Main Submission: Ground truth vs. Training from 2000

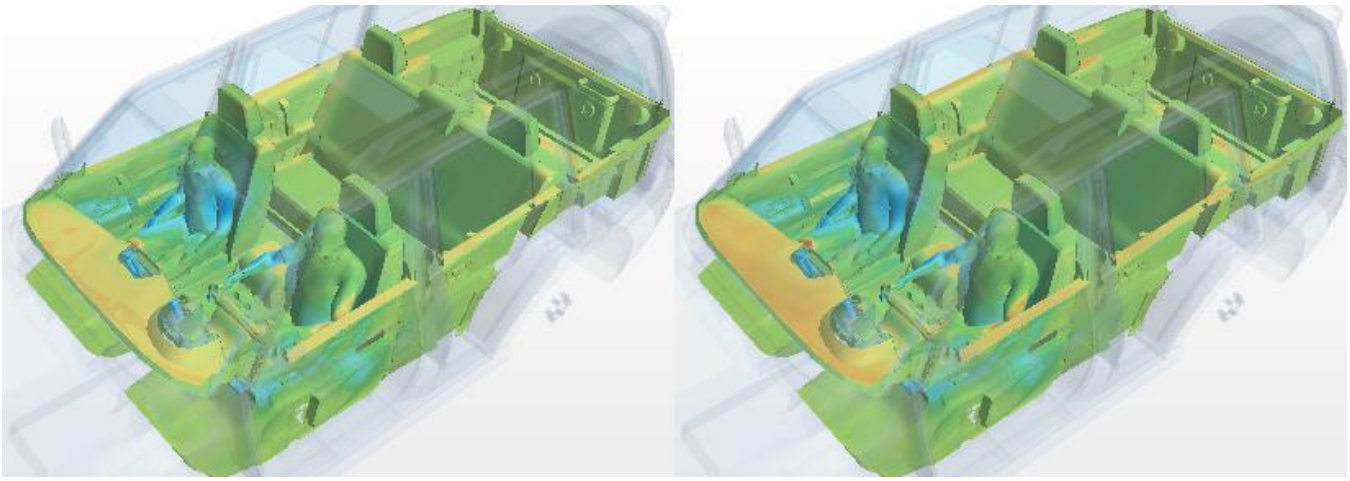


Figure 17: Zoomed-in view of Figure 3(c) of the Main Submission: Ground truth vs. Training from 50

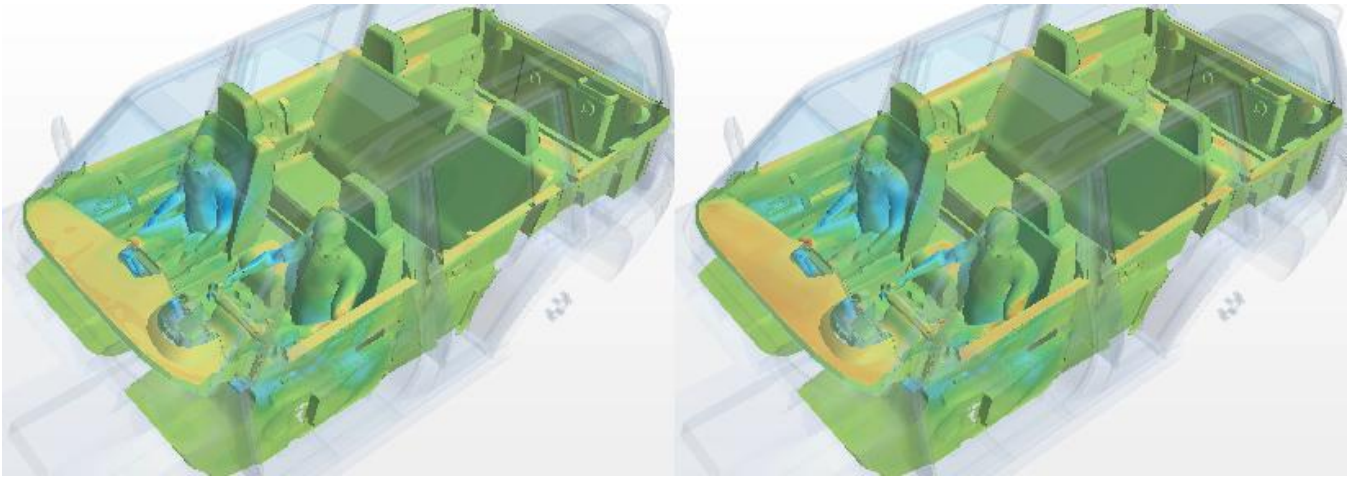


Figure 18: Zoomed-in view of Figure 3(c) of the Main Submission: Ground truth vs. Training from 100

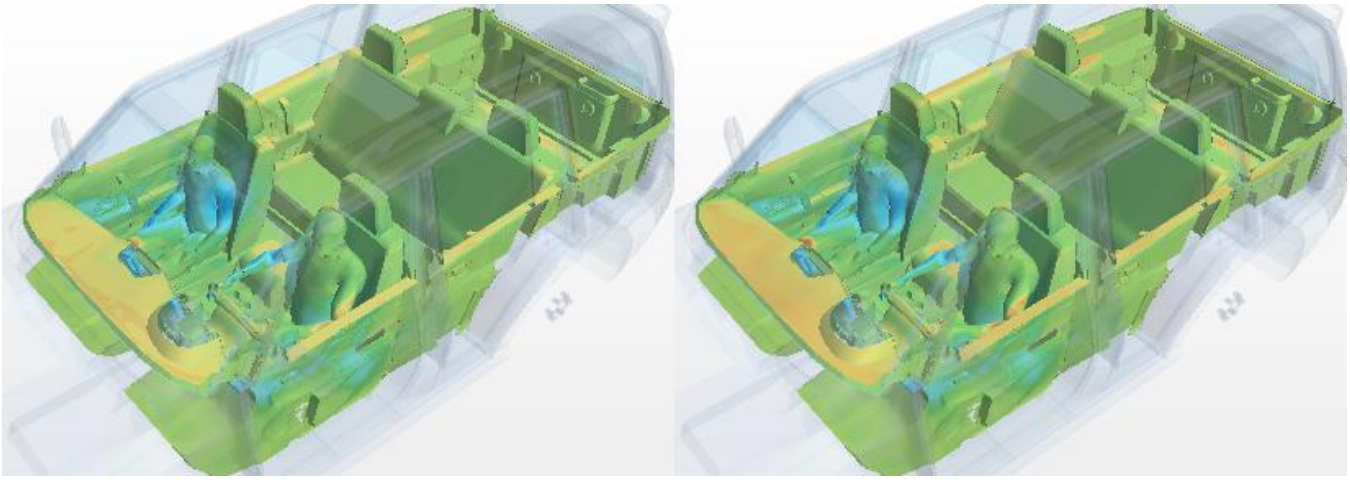


Figure 19: Zoomed-in view of Figure 3(c) of the Main Submission: Ground truth vs. Training from 150

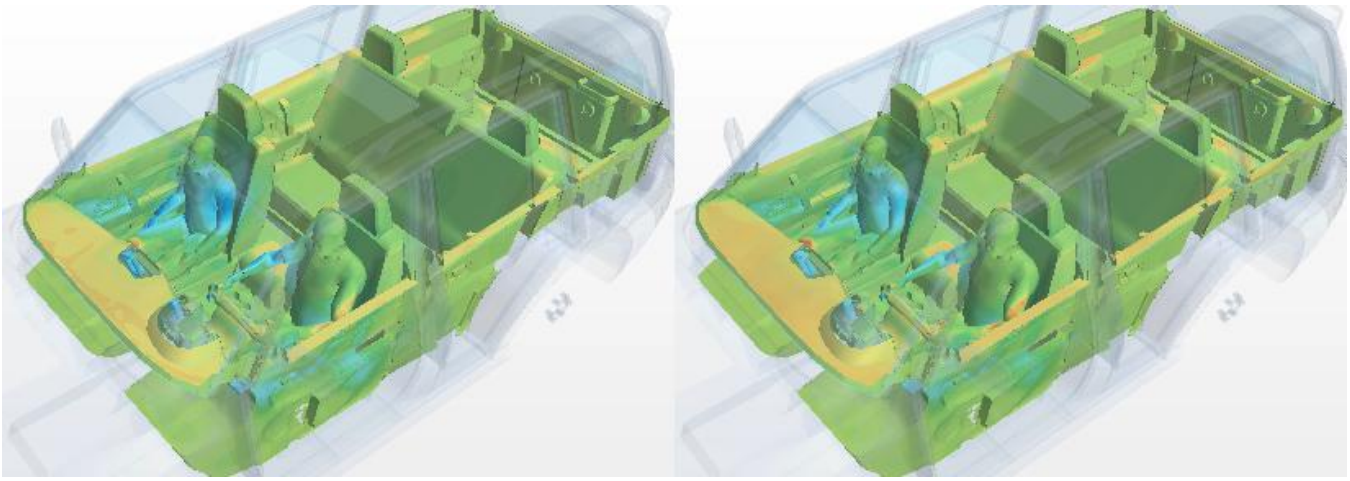


Figure 20: Zoomed-in view of Figure 3(c) of the Main Submission: Ground truth vs. Training from 200

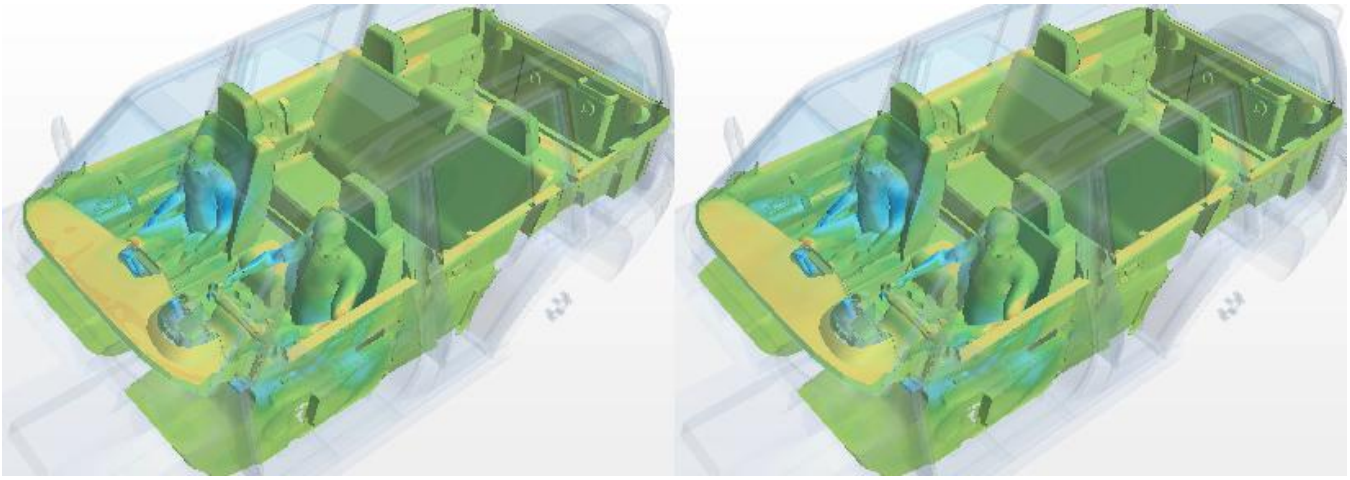


Figure 21: Zoomed-in view of Figure 3(c) of the Main Submission: Ground truth vs. Training from 500

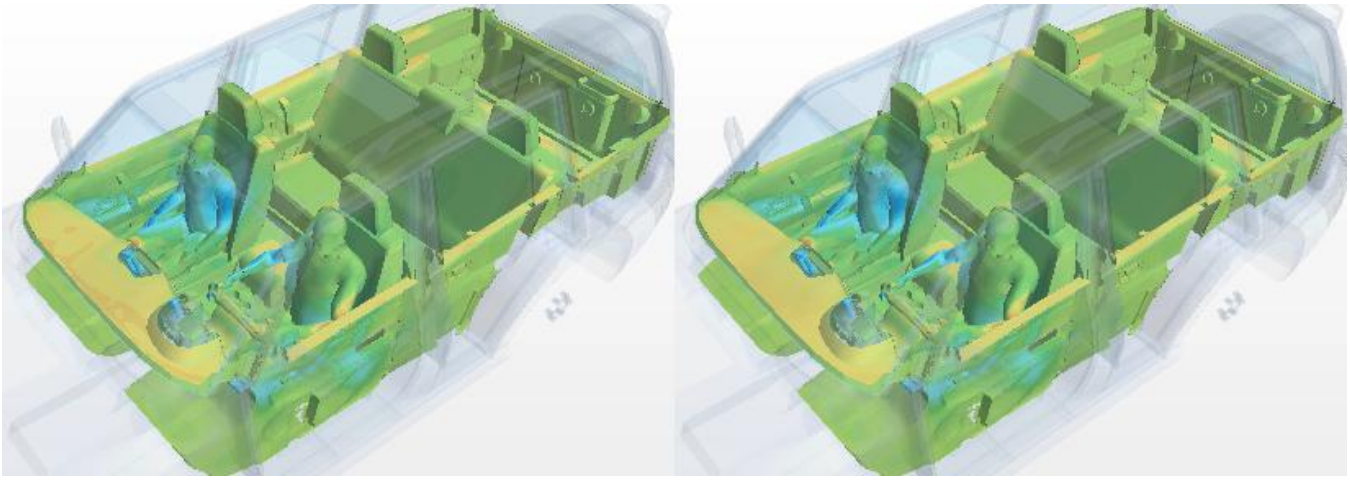


Figure 22: Zoomed-in view of Figure 3(c) of the Main Submission: Ground truth vs. Training from 1000

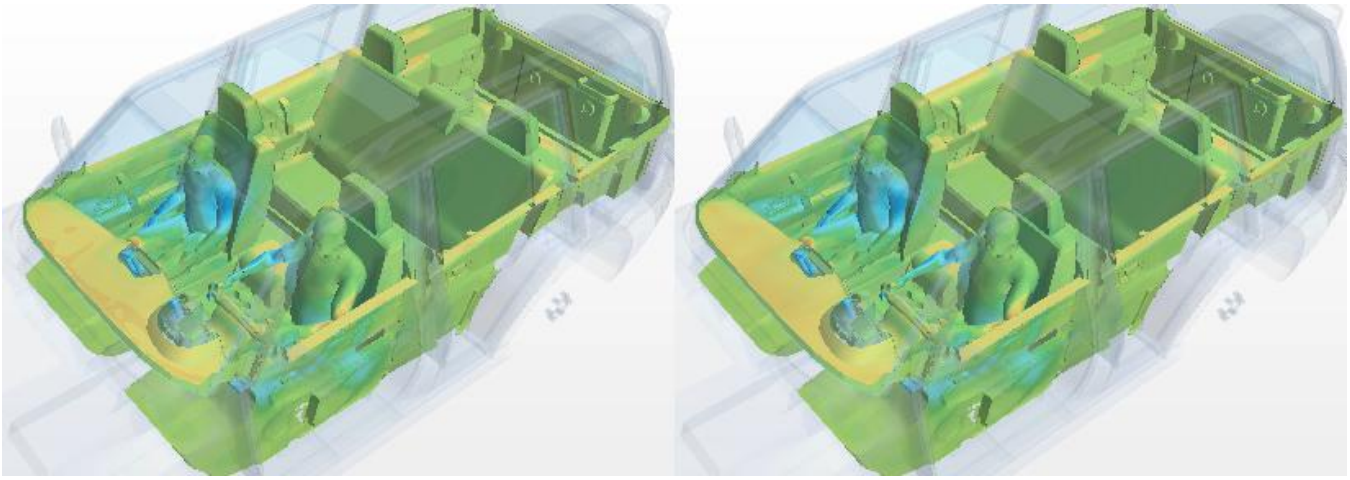


Figure 23: Zoomed-in view of Figure 3(c) of the Main Submission: Ground truth vs. Training from 1500

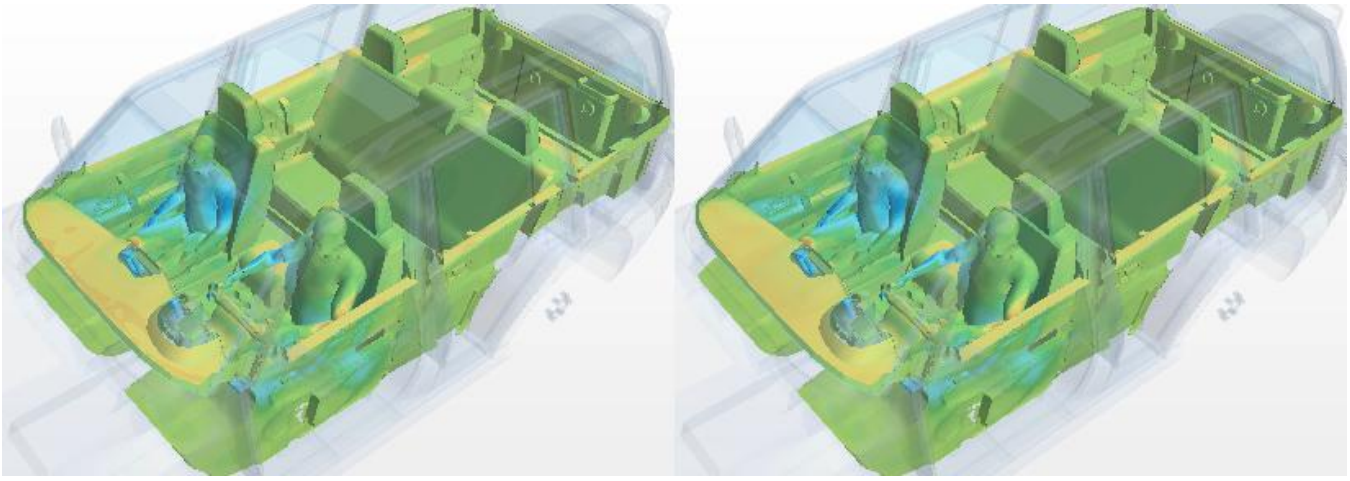
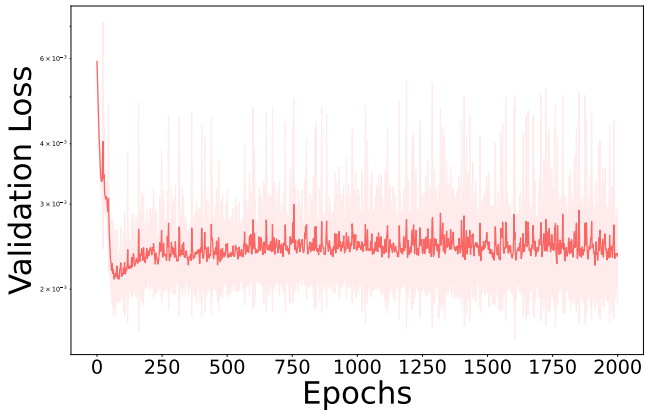


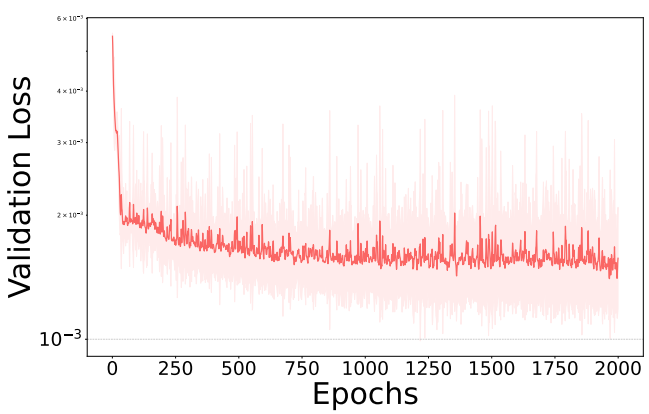
Figure 24: Zoomed-in view of Figure 3(c) of the Main Submission: Ground truth vs. Training from 2000

Evolution of Validation Loss during Training

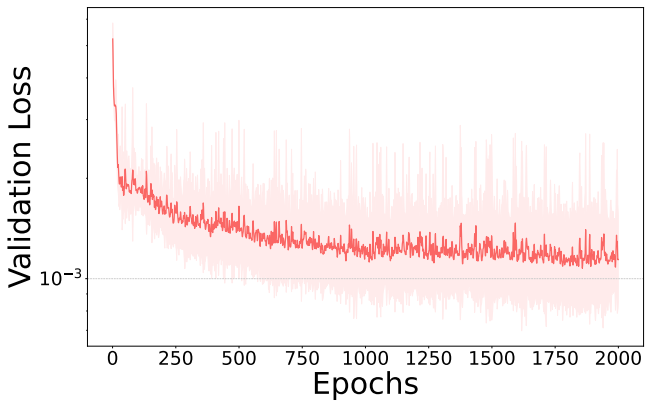
Figure 25 illustrates the losses on the validation set with the training epochs. We notice that the training curves become smoother as training sizes increase.



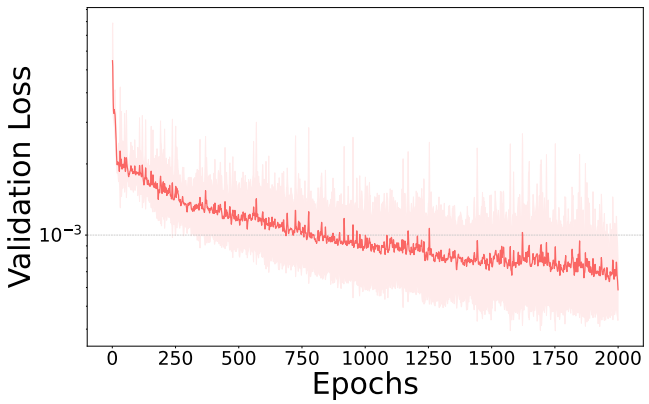
(a) Size of training set: 50



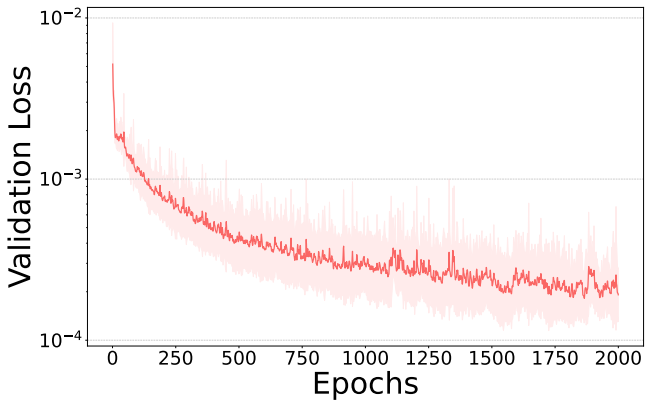
(b) Size of training set: 100



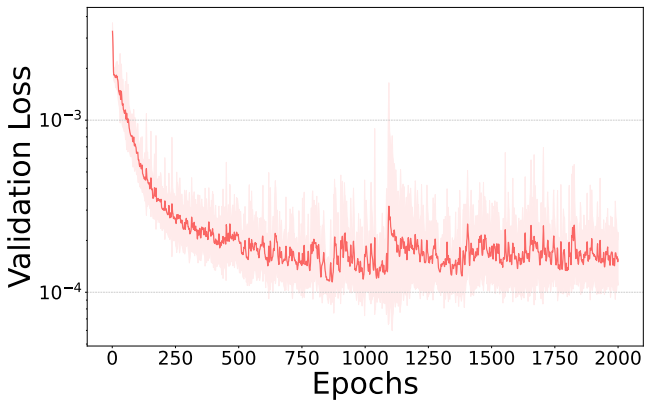
(c) Size of training set: 150



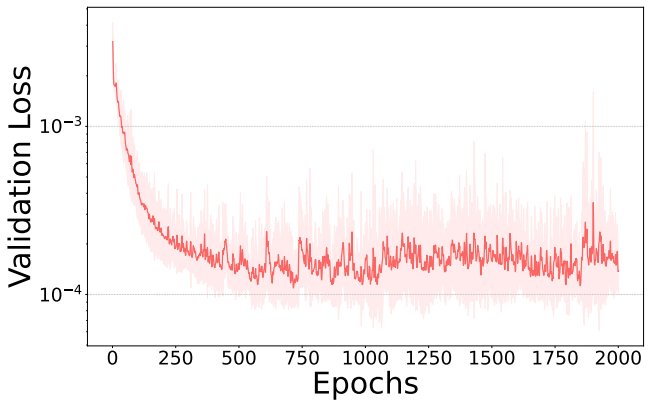
(d) Size of training set: 200



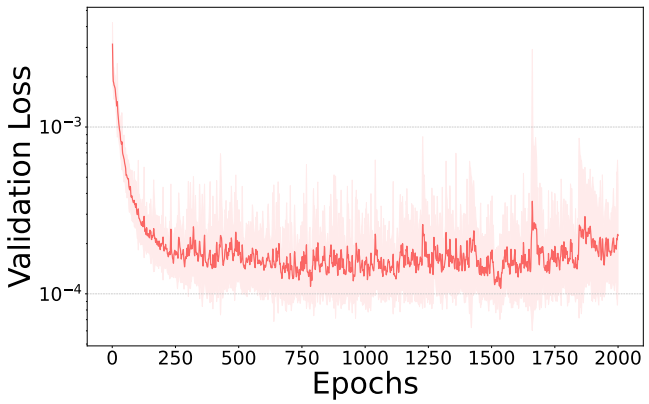
(e) Size of training set: 500



(f) Size of training set: 1000



(g) Size of training set: 1500



(h) Size of training set: 2000

Figure 25: Evolution of validation loss during the course of training. The individual panels correspond to different sizes of the training dataset.