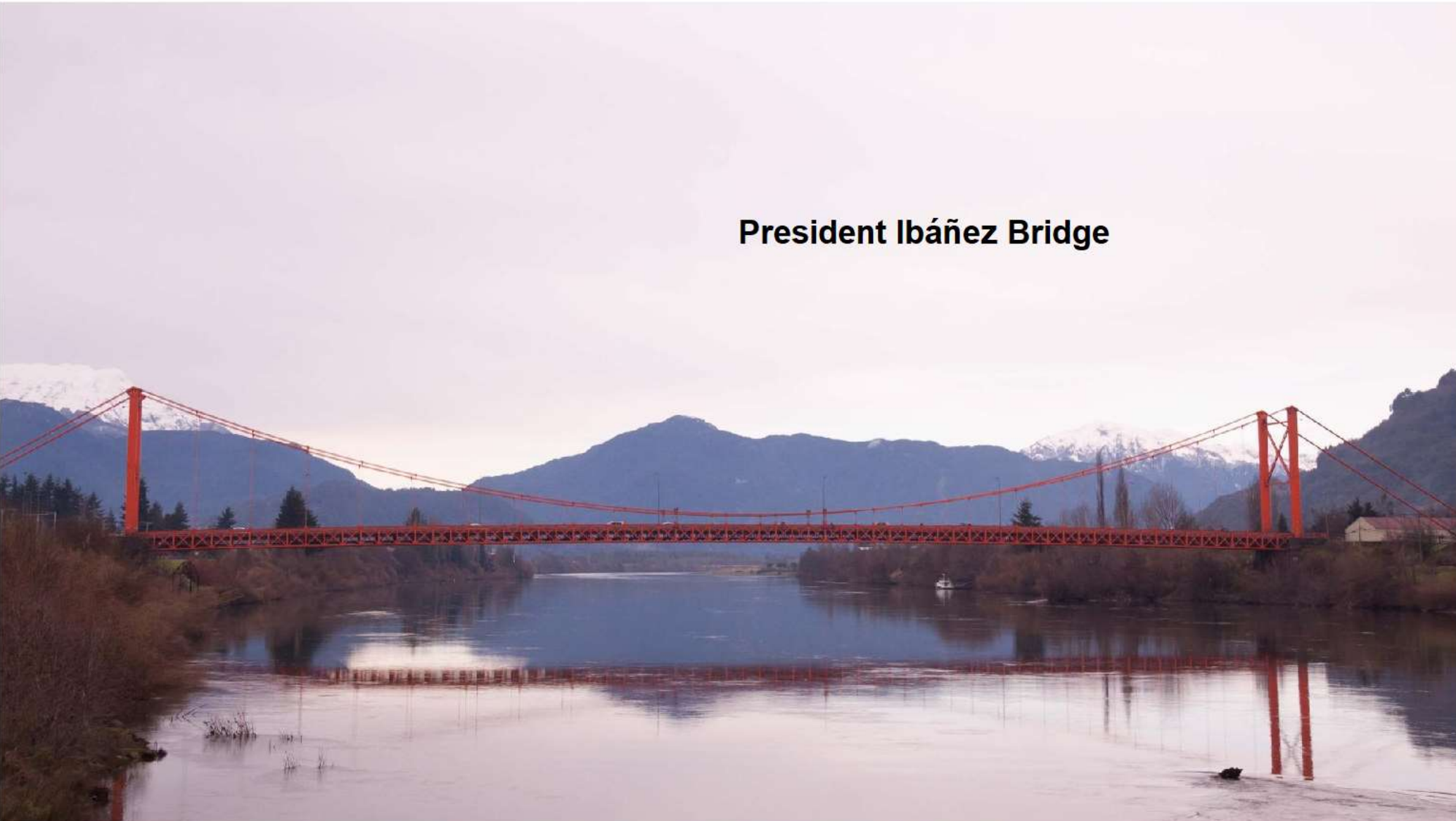


>> IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL <<

CABLE SUSPENSION BRIDGE

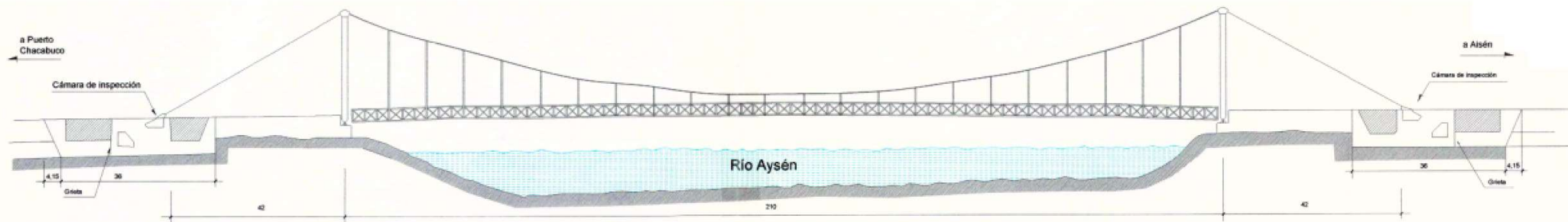
PRESENTED BY SALAR DELAVAR GHASHGHAEI (QASHQAI)

President Ibáñez Bridge

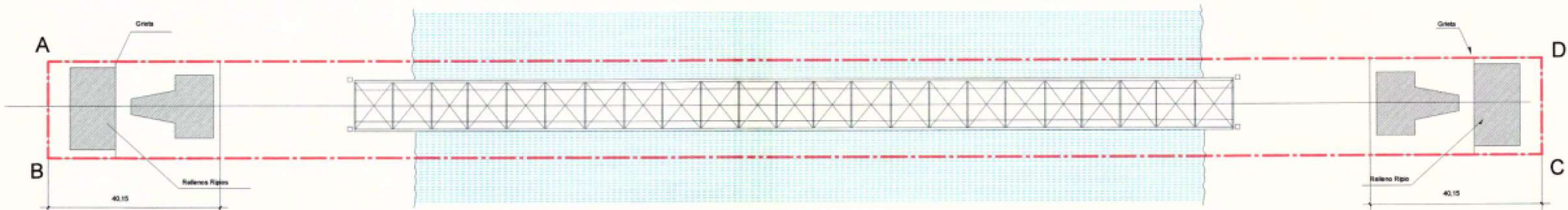




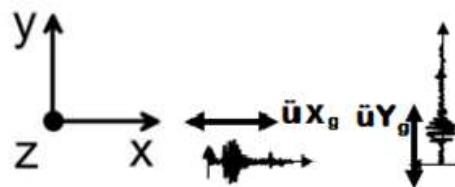
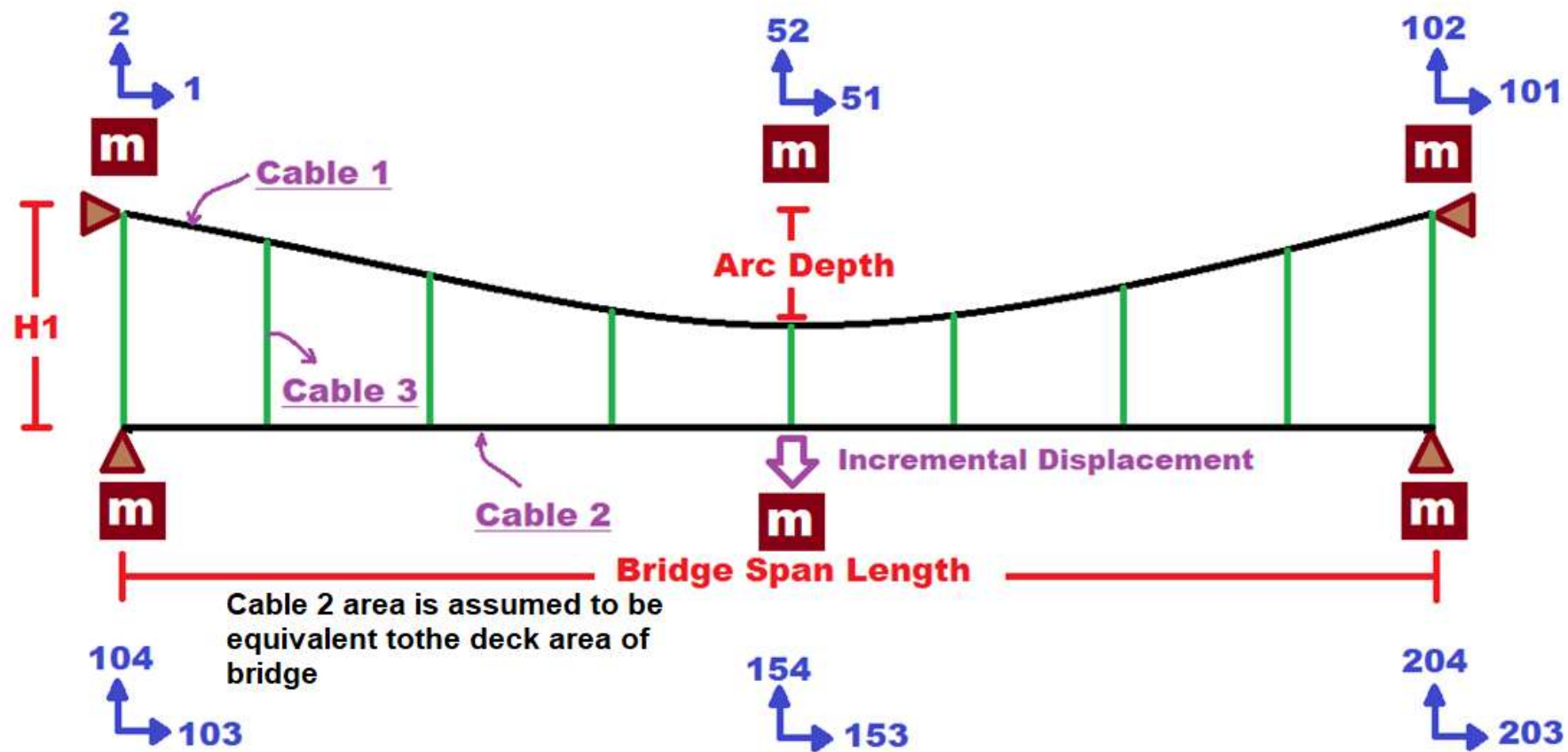




ELEVATION



PLAN



Spyder (Python 3.12)

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C:\Users\Dell\Desktop\OPENSEES_FILES\CABLE_SUSPEN..._BRIDGE_04\OPENSEES_CABLE_SUSPENSION_BRIDGE_04.py

OPENSEES_CABLE_SUSPENSION_BRIDGE_04.py

```
1 # #####
2 # >> IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL
3 # CABLE SUSPENSION BRIDGE 04
4 #
5 # President Ibáñez Bridge
6 #
7 # THIS PROGRAM WRITTEN BY SALAR DELAVAR GHASHGHAEE (QASHQAI)
8 # EMAIL: salar.d.ghashghaei@gmail.com
9 # #####
10
11 Suspension Bridge:
12 A suspension bridge is a bridge type that uses strong steel cables and tall towers to support the deck.
13 Unlike simple beam bridges, which rest on multiple supports, suspension bridges can cover large spans.
14
15 It has a total length of about 210 meters, two steel towers about 25 meters tall,
16 and sets of eight main steel cables on each side that support the concrete deck
17 through vertical hangers. This structure shows how suspension bridges can cross
18 large rivers even in remote regions.
19
20 Key Features:
21 - Structural Concept
22 Suspension bridges have steel cables stretched between tall towers.
23 The cables carry the deck's weight and transfer the load to the towers, which send the load to the foundations.
24 The deck itself is usually stiffened with longitudinal and transverse beams to resist twisting.
25
26 - Design Purpose
27 They are designed to carry vehicles, bicycles, and pedestrians across wide gaps such as rivers, valleys, or bays.
28 Suspension bridges are often used where long spans are required and building many supports is impractical.
29
30 - Load Characteristics
31 These bridges carry heavy loads, including car and truck traffic.
32 The loads are transferred from the deck to vertical hangers, then to the main cables, and finally to the towers.
33
34 Advantages:
```

Pushover Analysis: Cable and Deck Deformed Shapes

The plot displays the initial and deformed shapes of the cables and deck under a pushover analysis. The x-axis represents the horizontal displacement (X [mm]) from 0 to 200,000, and the y-axis represents the vertical displacement (Y [mm]) from 0 to 25,000. The legend indicates: Initial Cable Shape (blue line with circles), Deformed Cable Shape (red line with circles), Initial Deck Shape (green line with circles), Deformed Deck Shape (yellow line with circles), Initial Connecting Elements (cyan line with circles), Deformed Connecting Elements (magenta line with circles), and Simply Supported Nodes (red triangles). The cables show a significant increase in vertical displacement under load, while the deck remains relatively flat.

Help Variable Explorer Debugger Plots Files

Console 1/A

Median: -8.0370e+06
Mean: 4.3100e+06
Std: 2.4523e+08
Third quantile: 1.0796e+08
Maximum: 1.3543e+09
Skewness: -4.2553e-02
kurtosis: 7.9877e+00
90% Confidence Interval: (-3.2379e+08, 3.6022e+08)

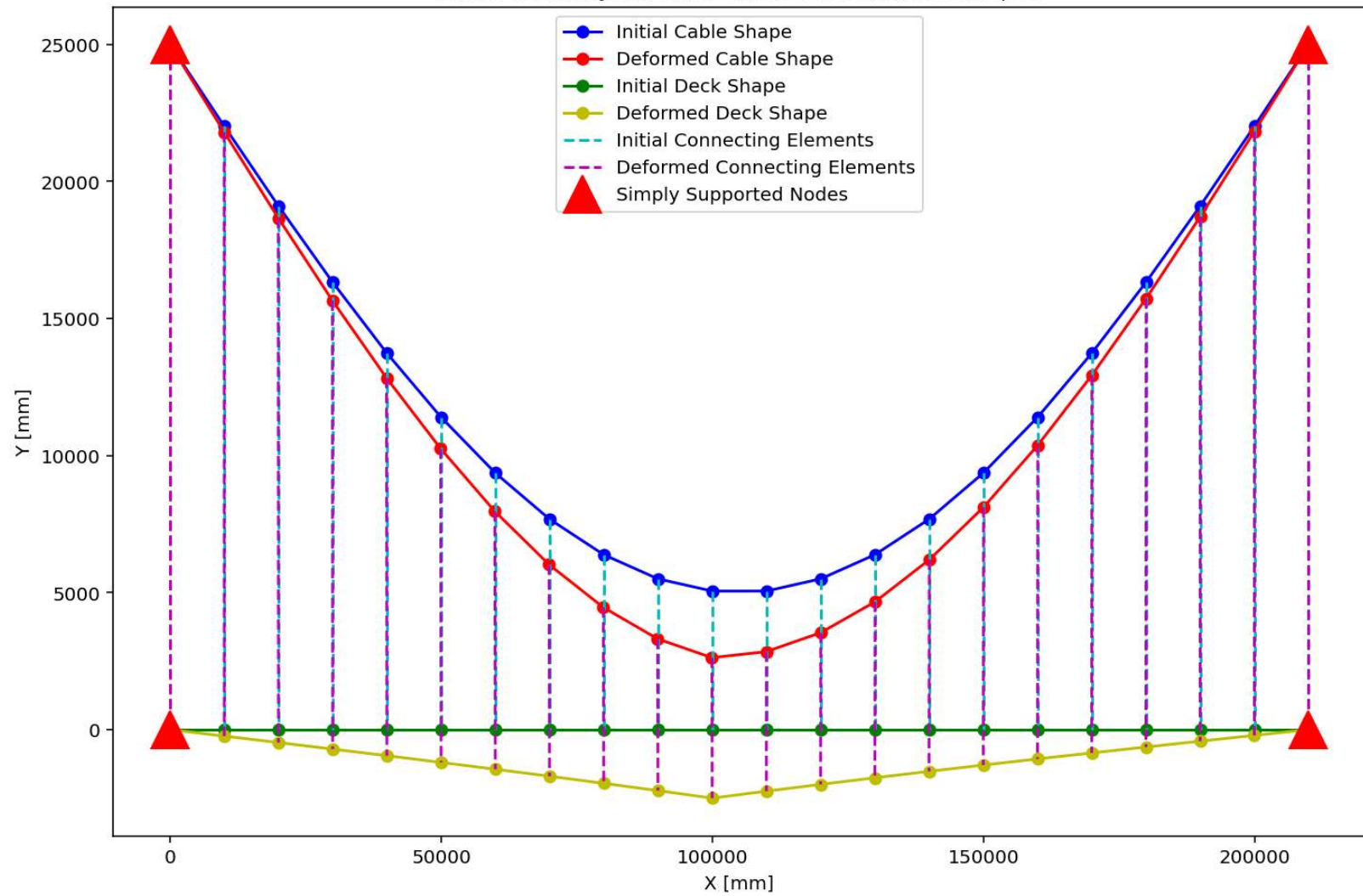
In [2]:

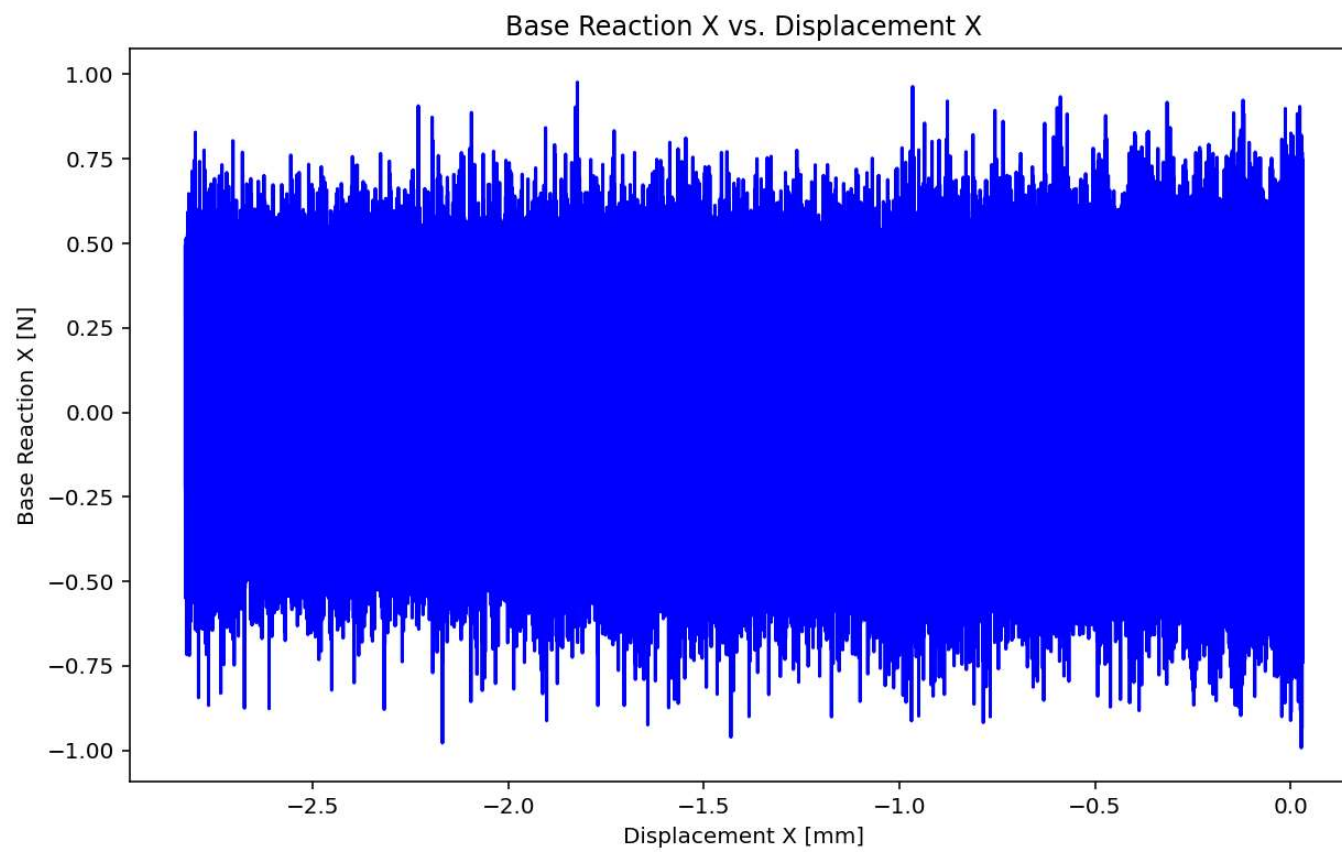
IPython Console History

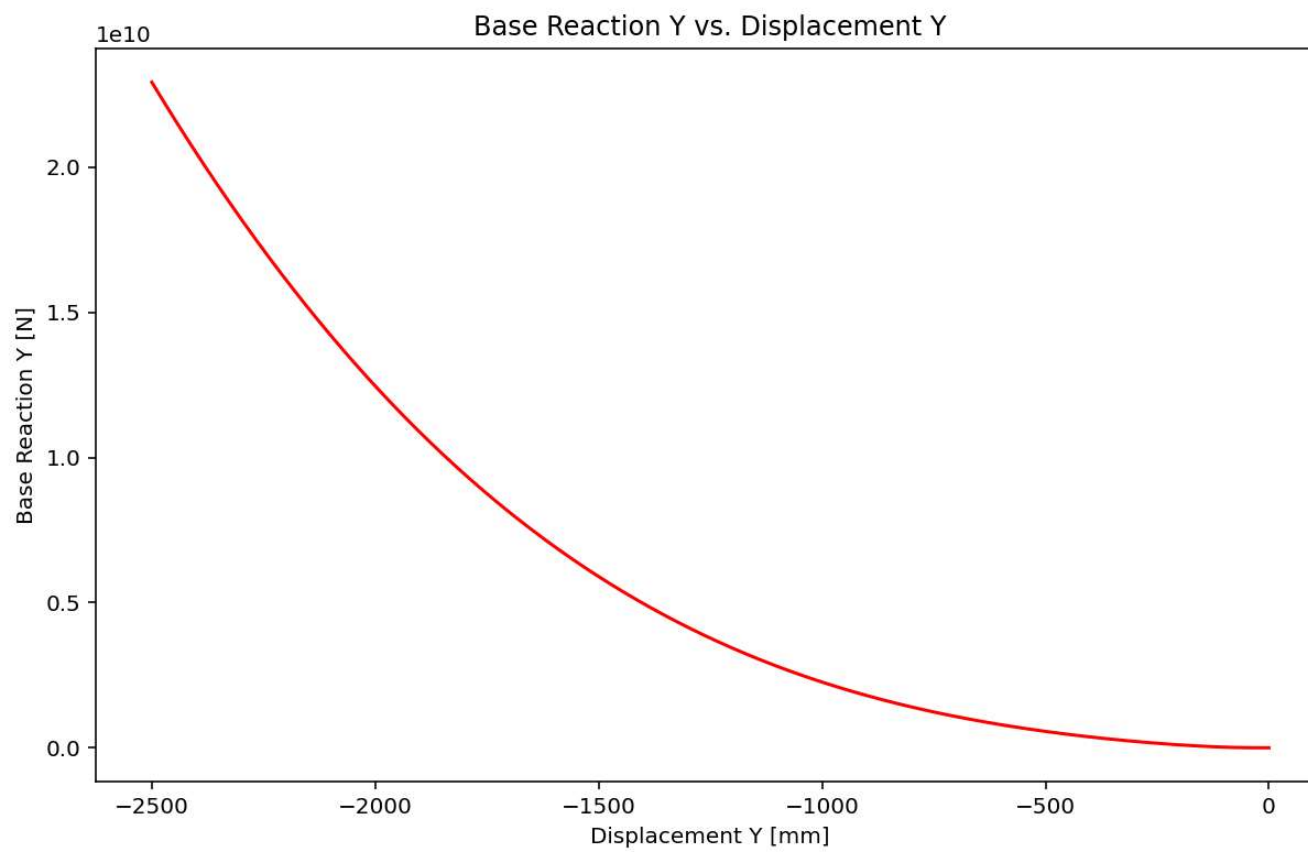
Inline Conda: anaconda3 (Python 3.12.7) LSP: Python Line 5, Col 104 UTF-8 CRLF RW Mem 54%

PUSHOVER ANALYSIS

Pushover Analysis: Cable and Deck Deformed Shapes

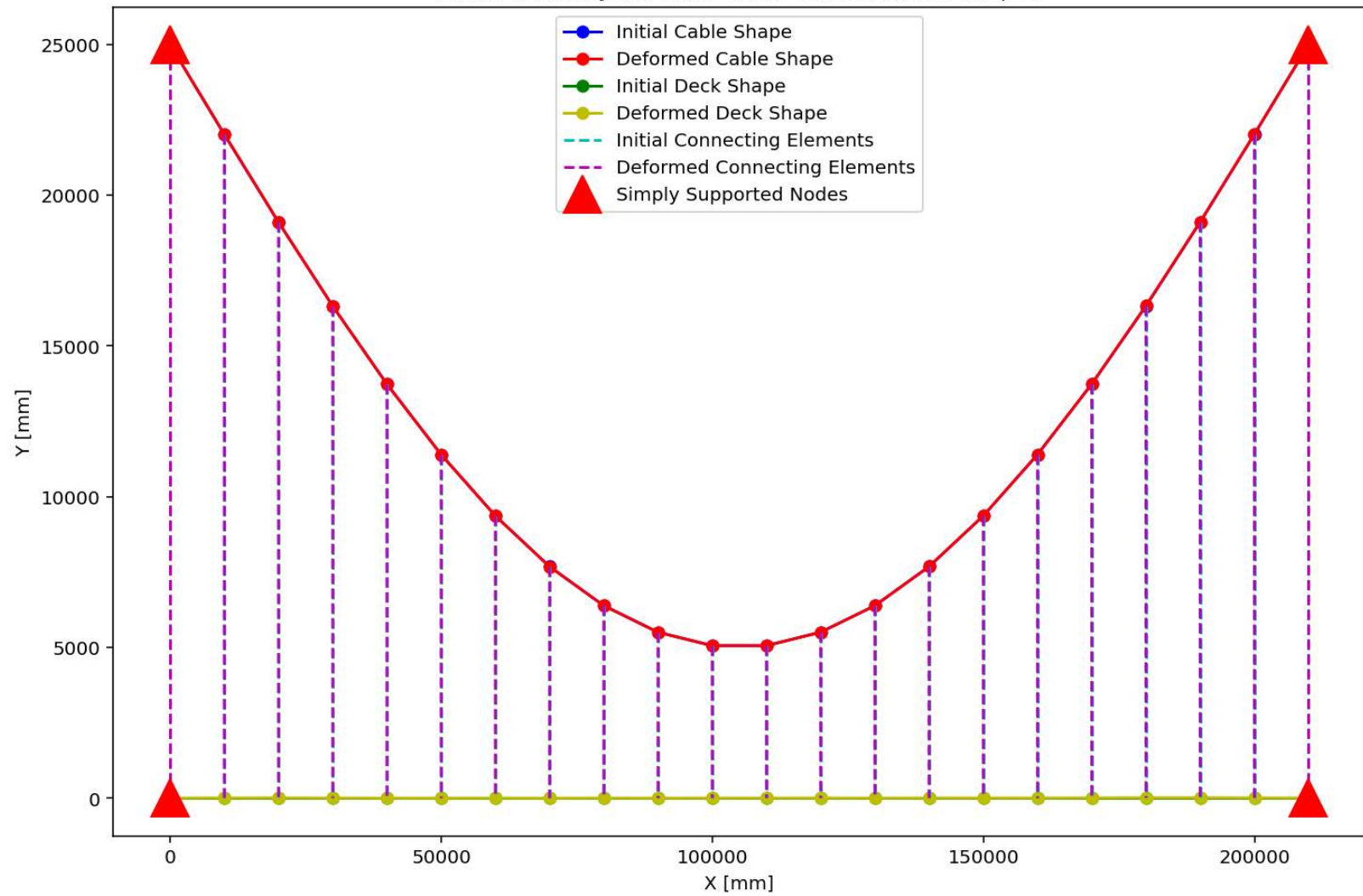




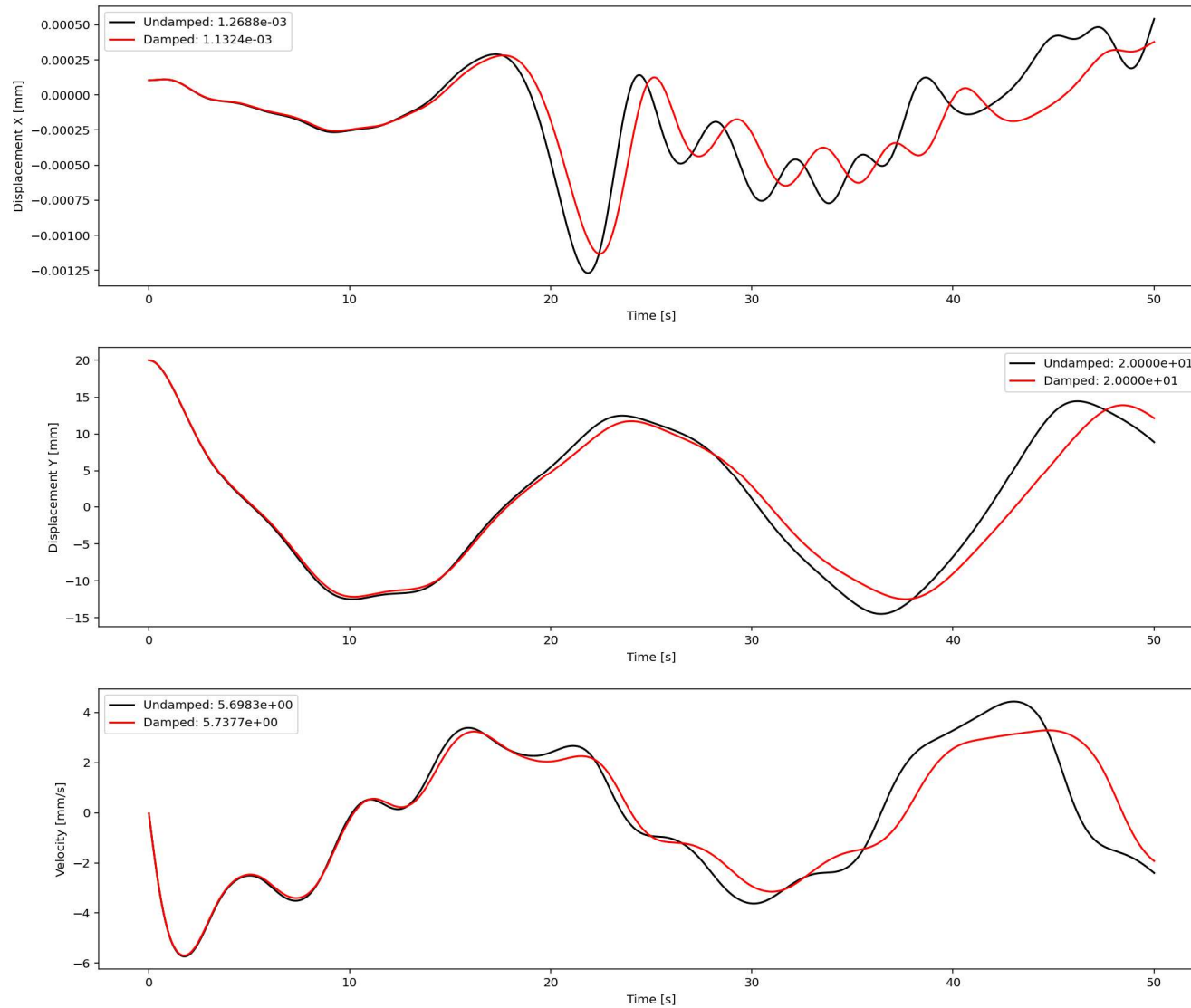


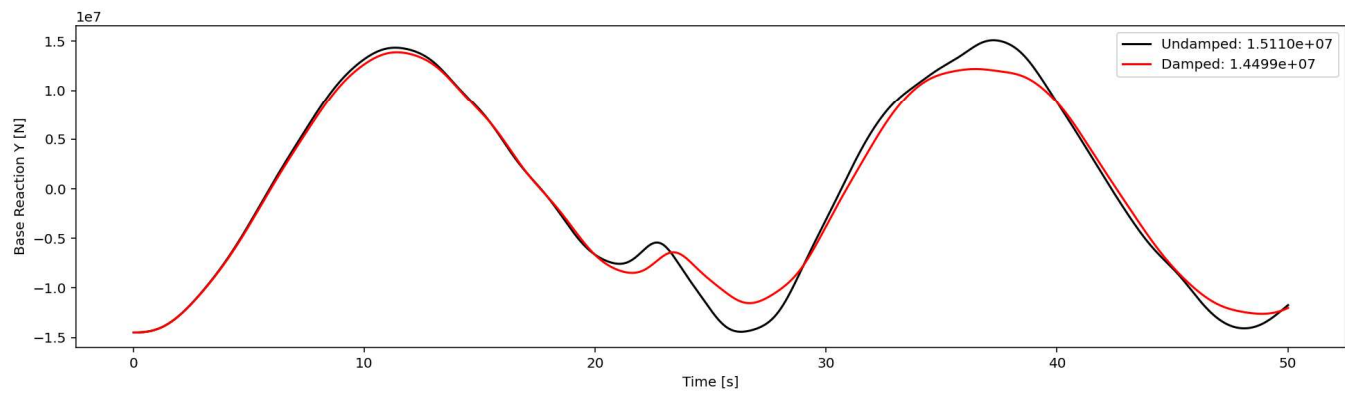
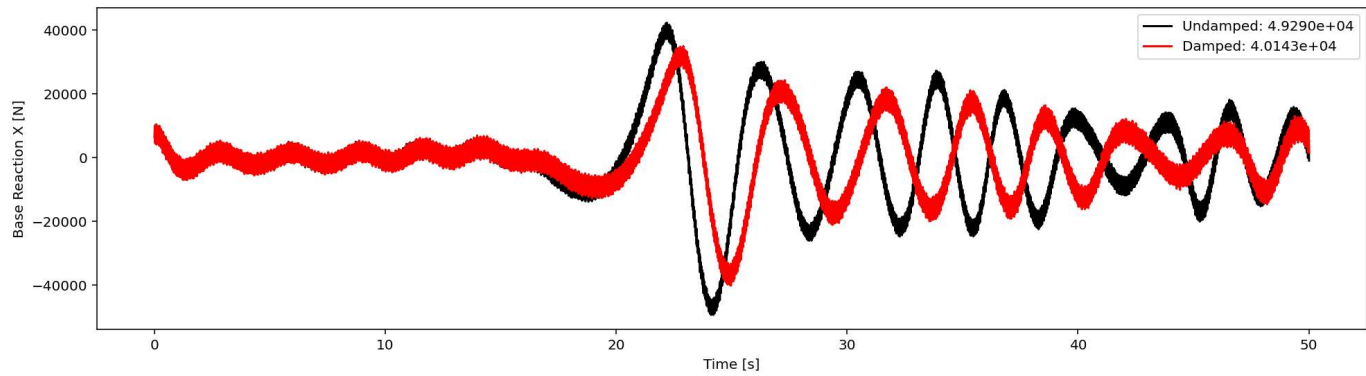
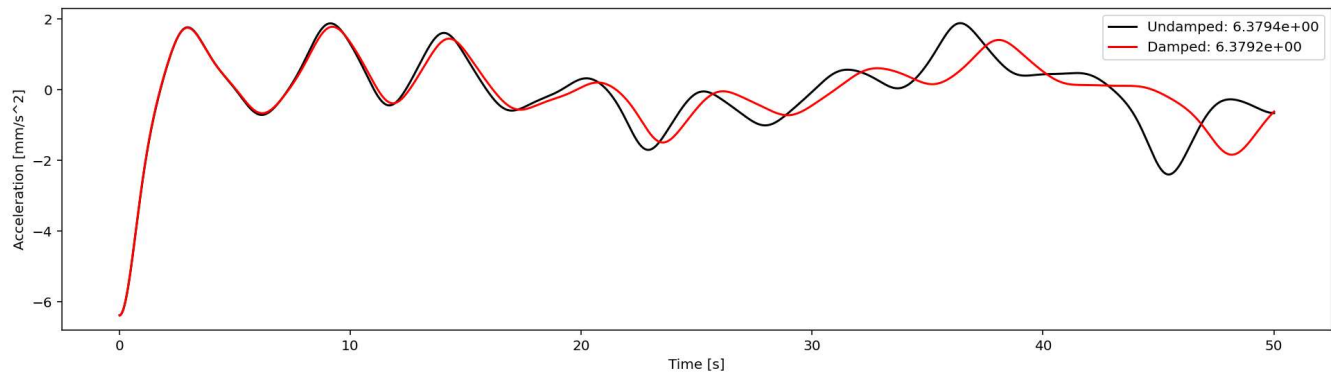
FREE-VIBRATION ANALYSIS

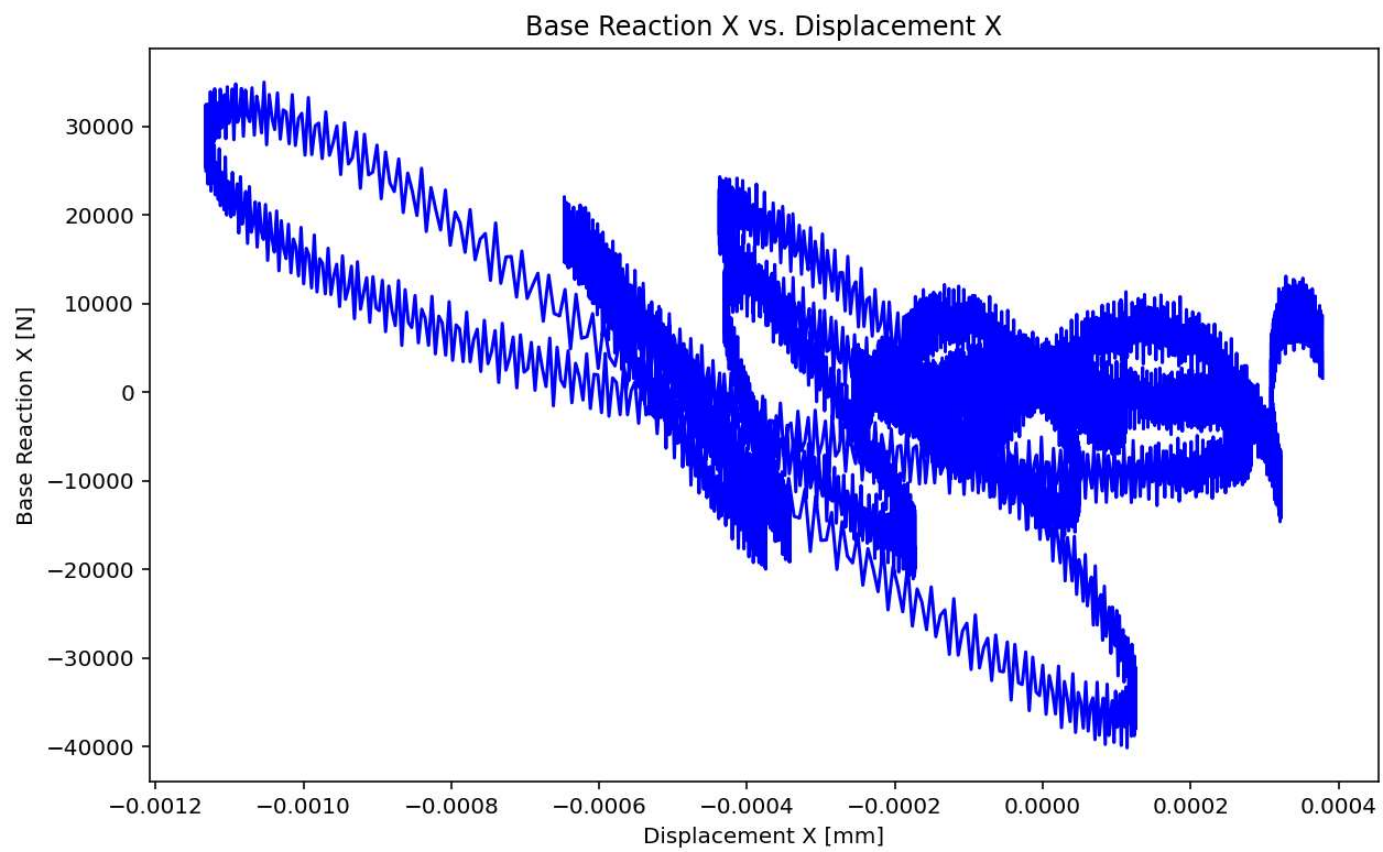
Pushover Analysis: Cable and Deck Deformed Shapes

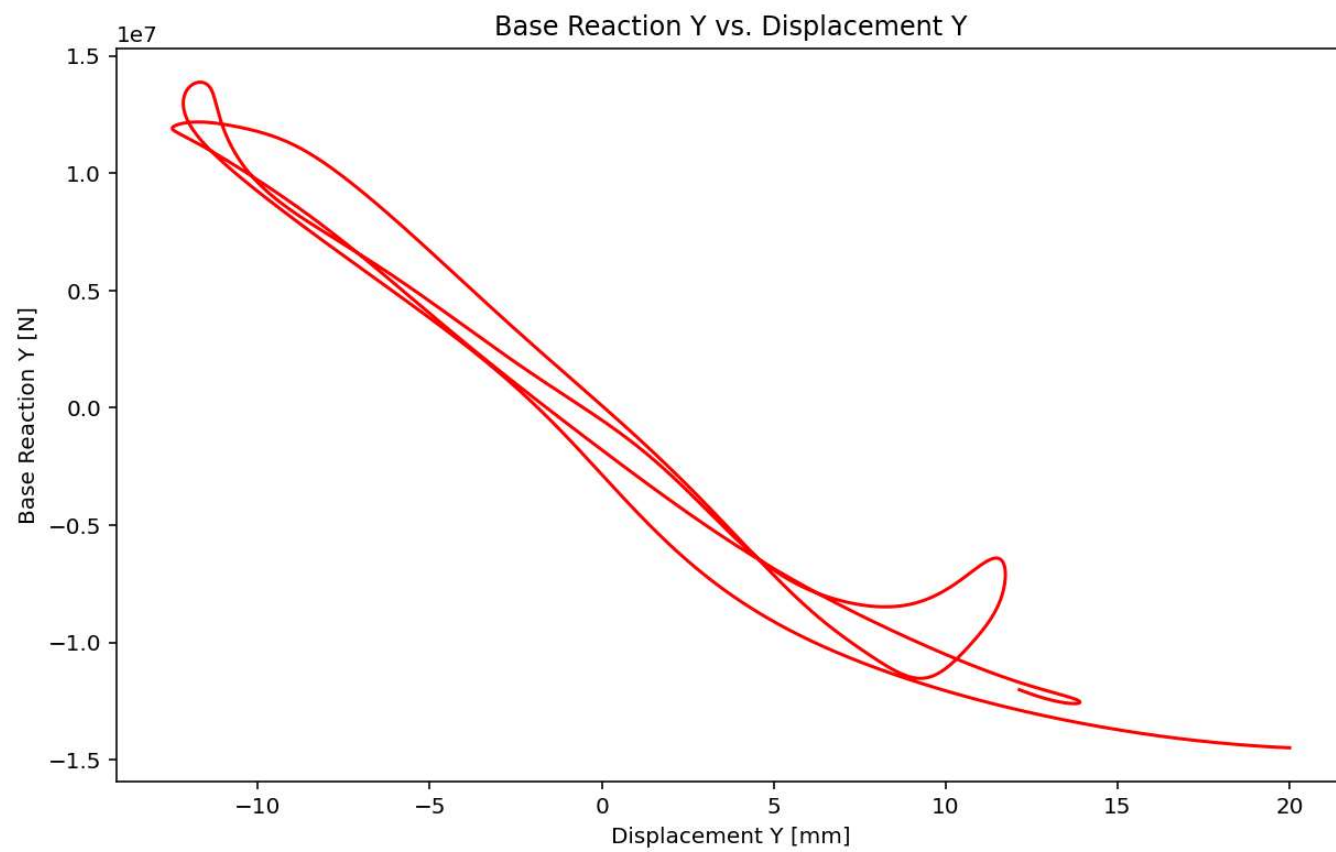


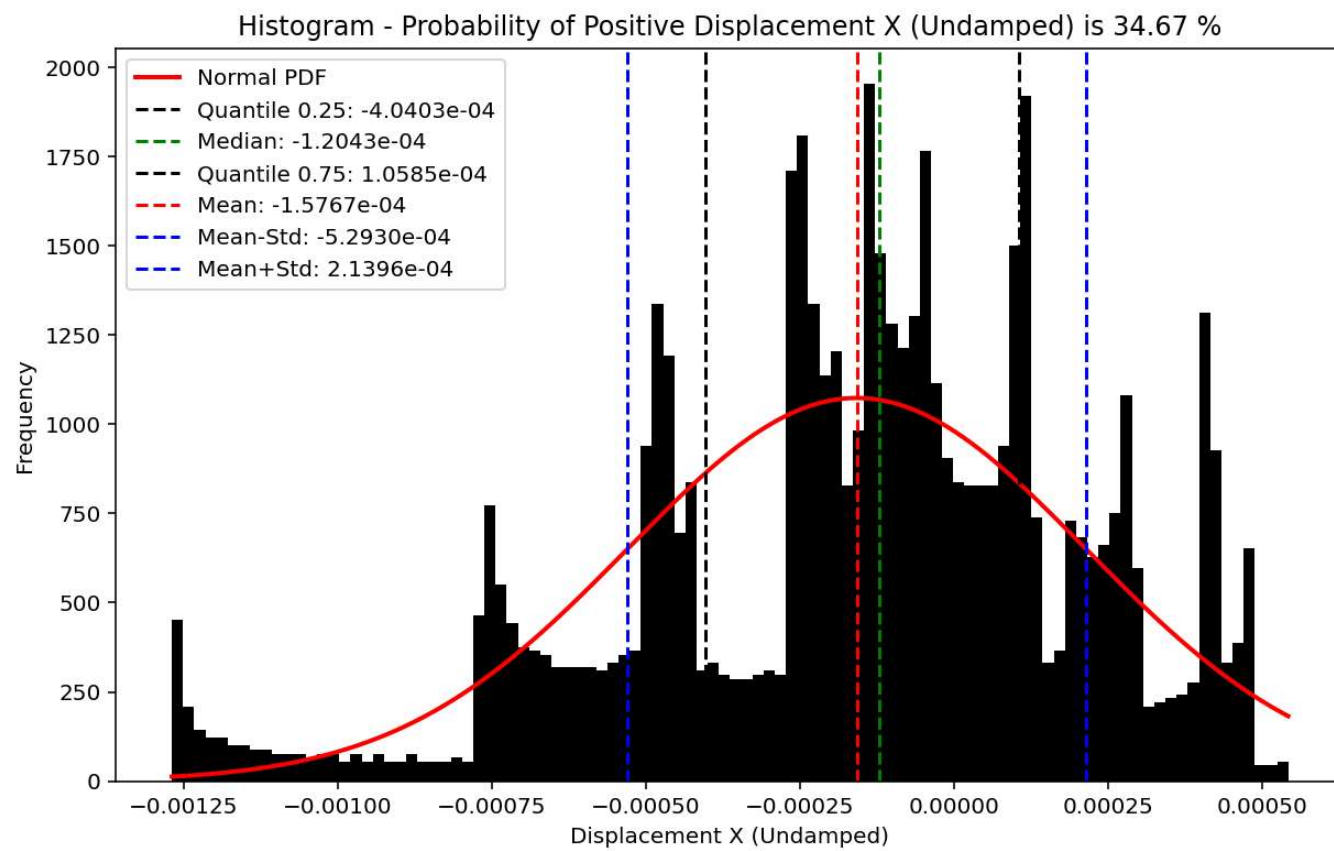
Time History of Free Vibration Analysis: Damped vs Undamped



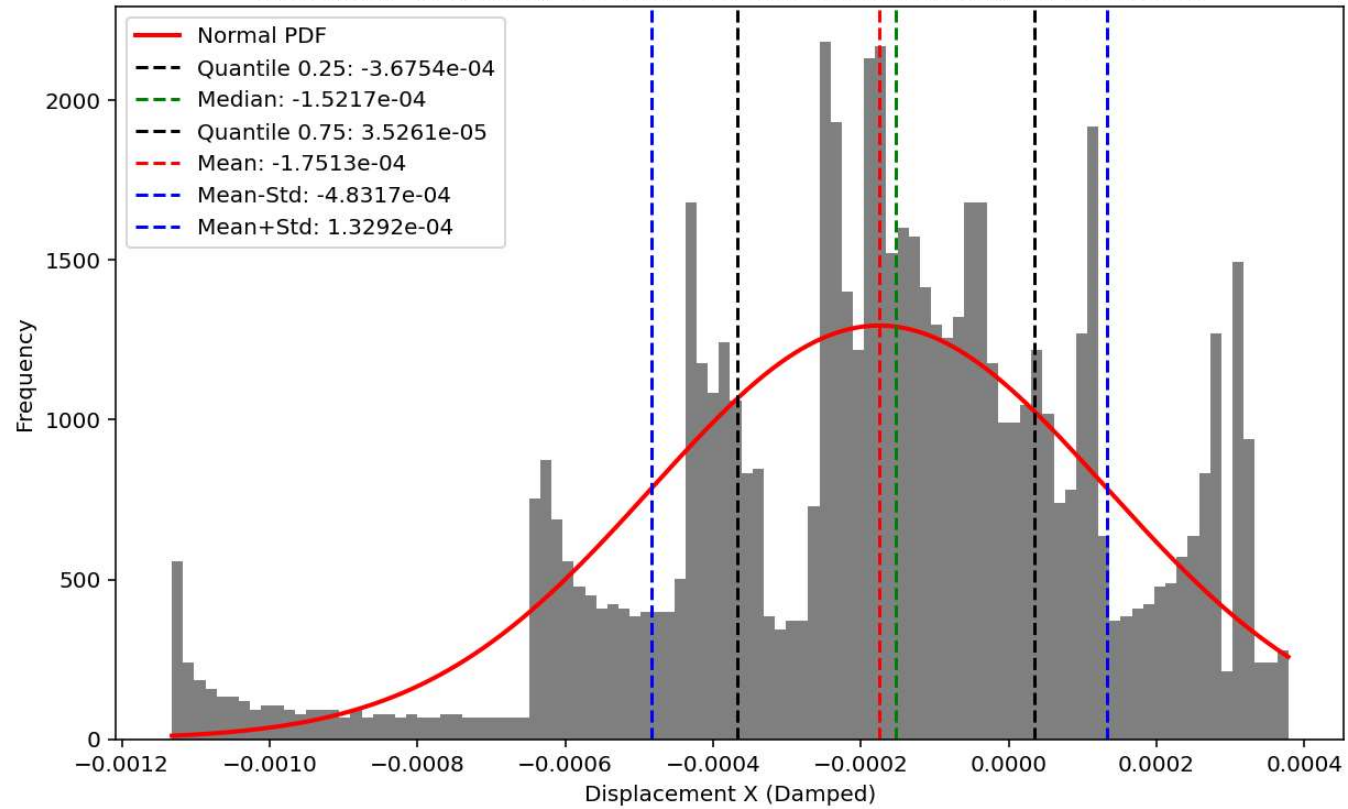


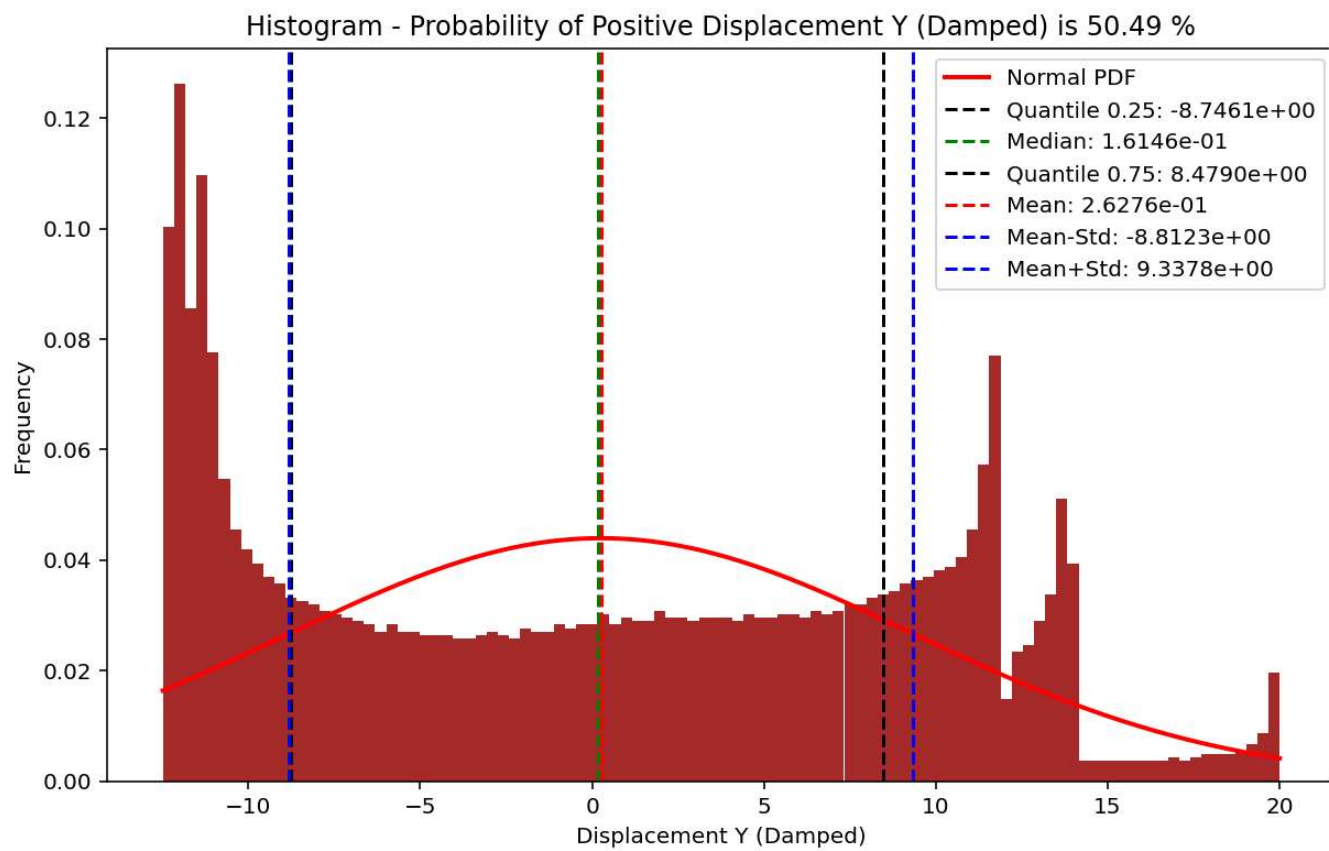


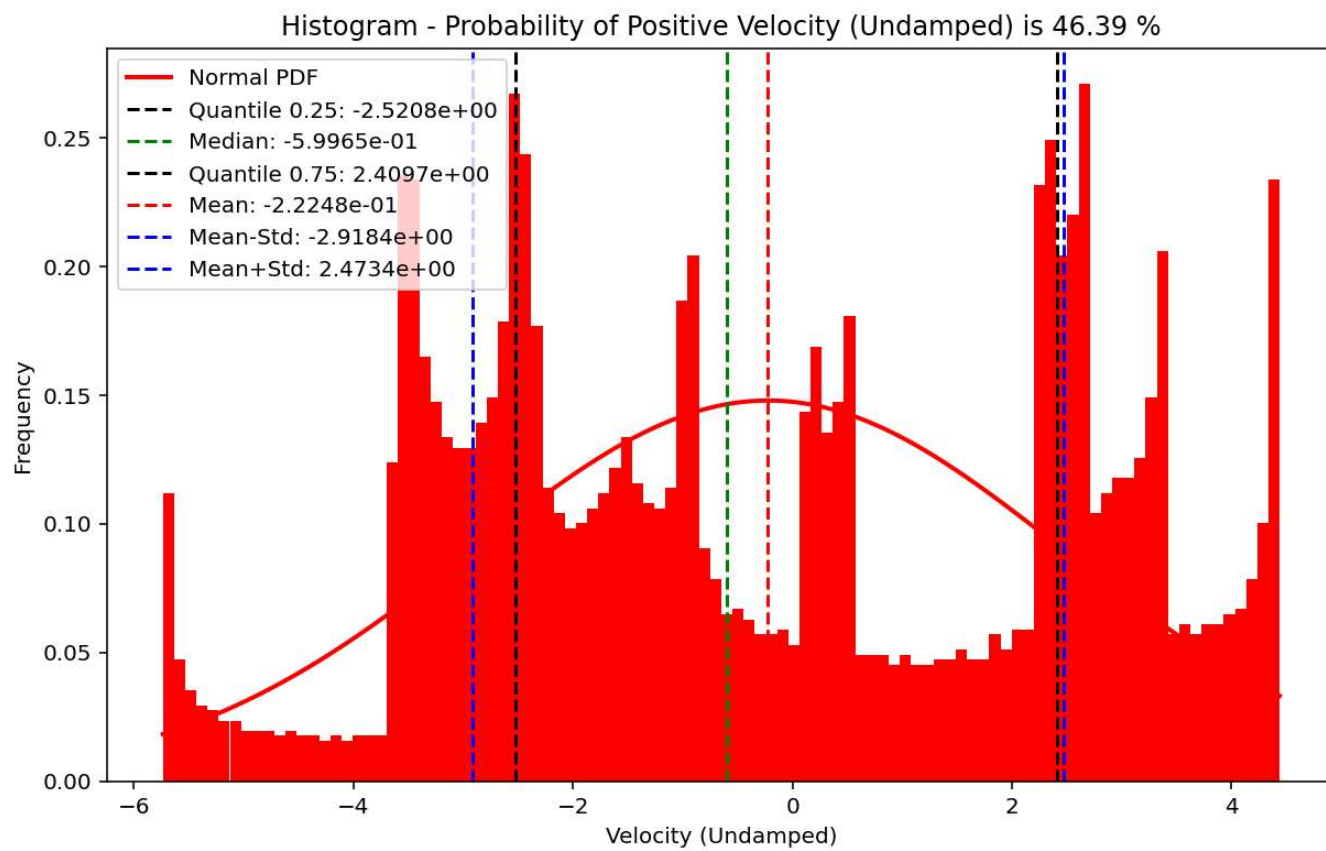


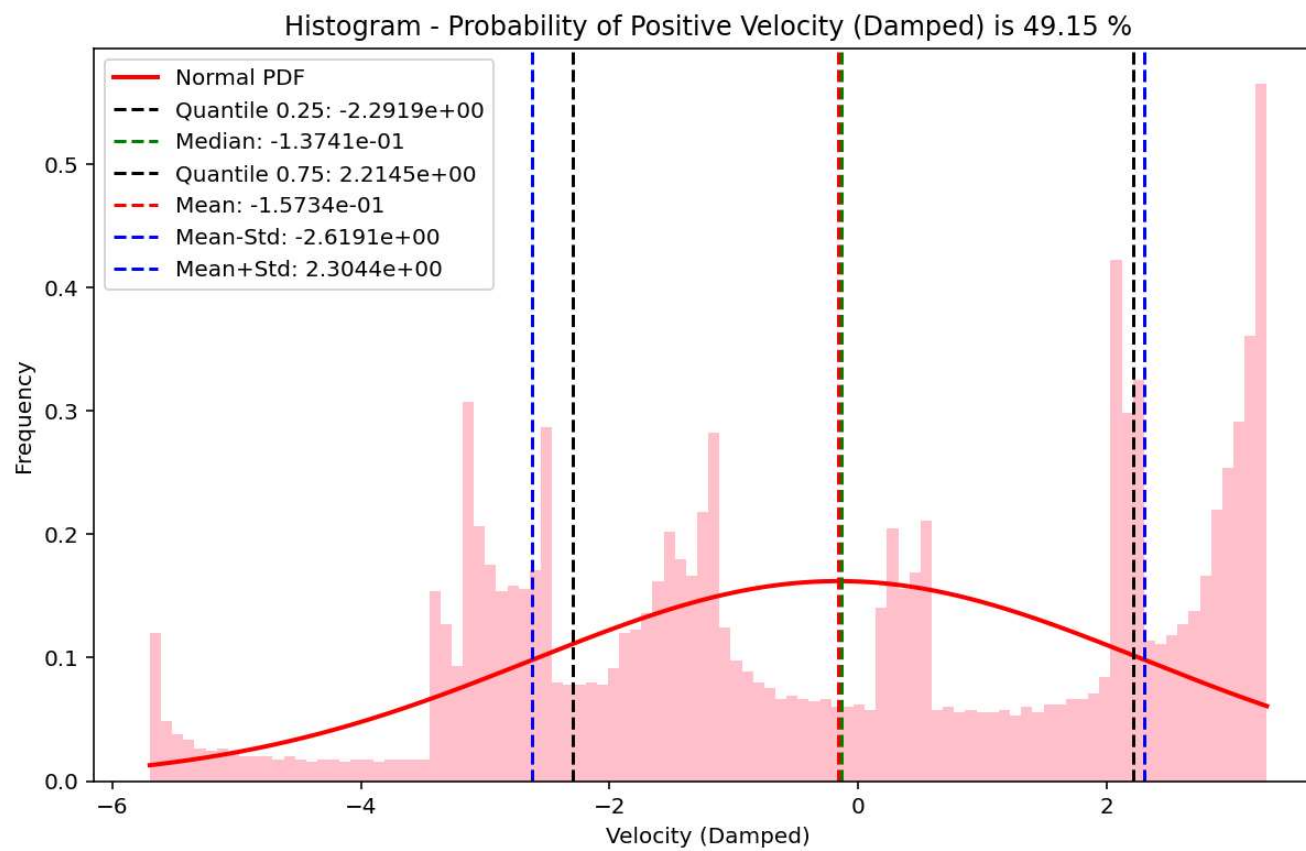


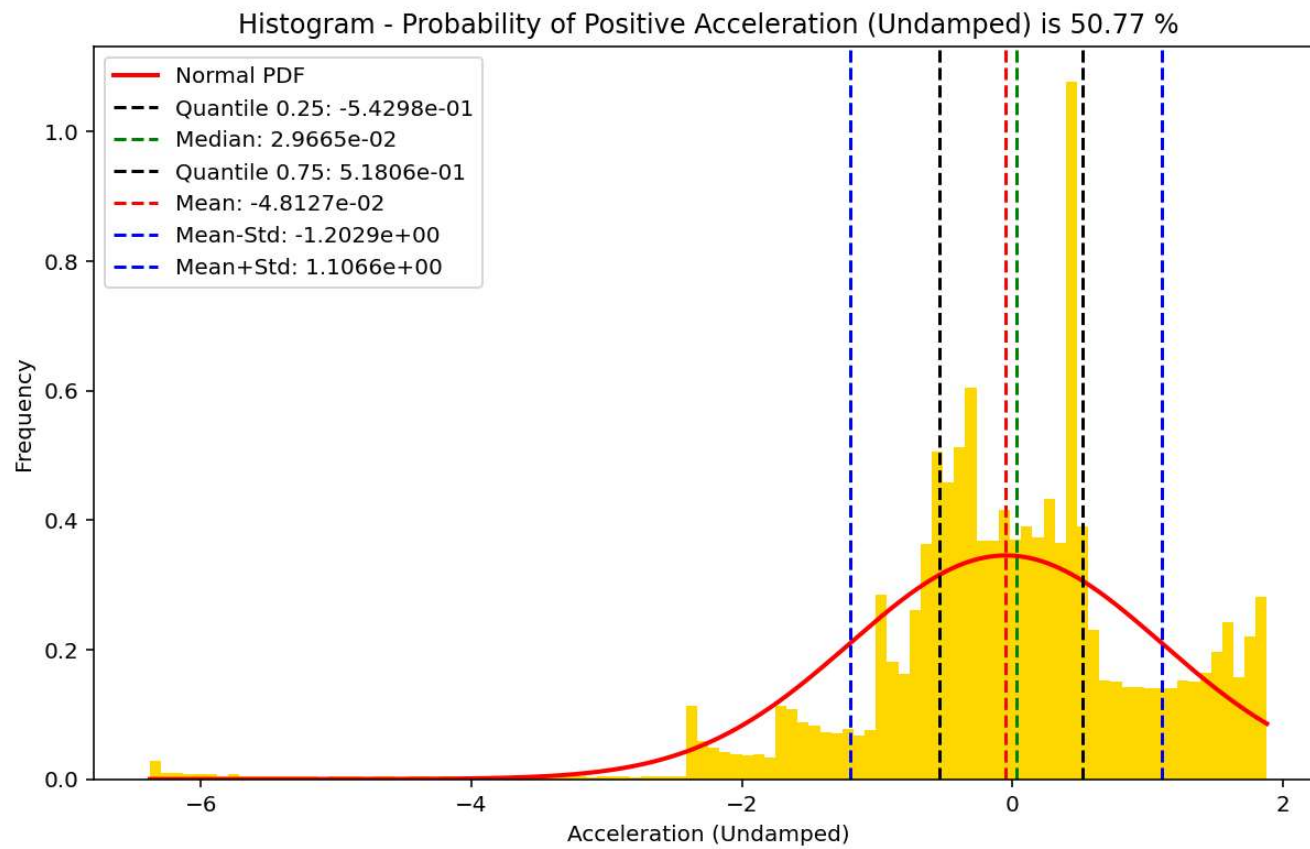
Histogram - Probability of Positive Displacement X (Damped) is 28.59 %

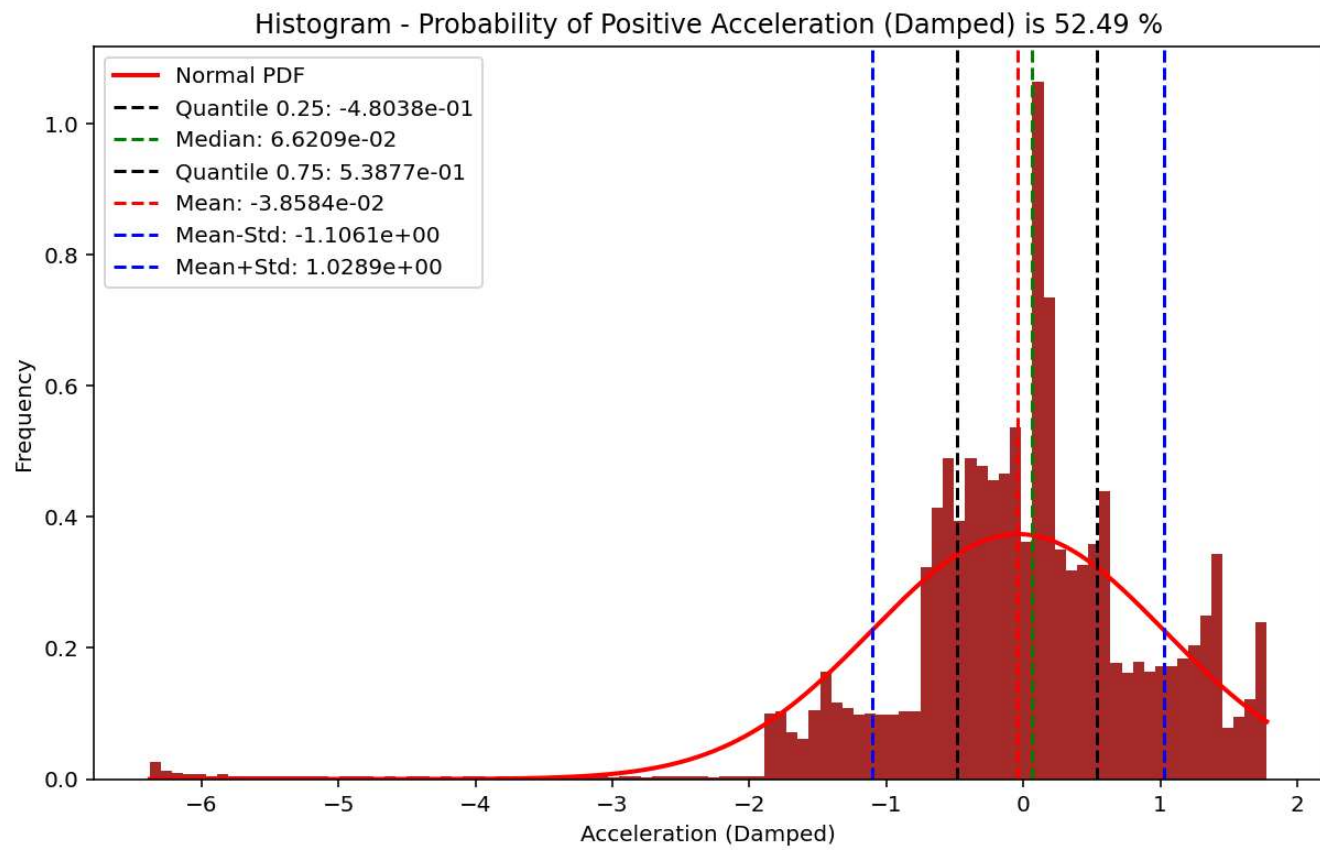


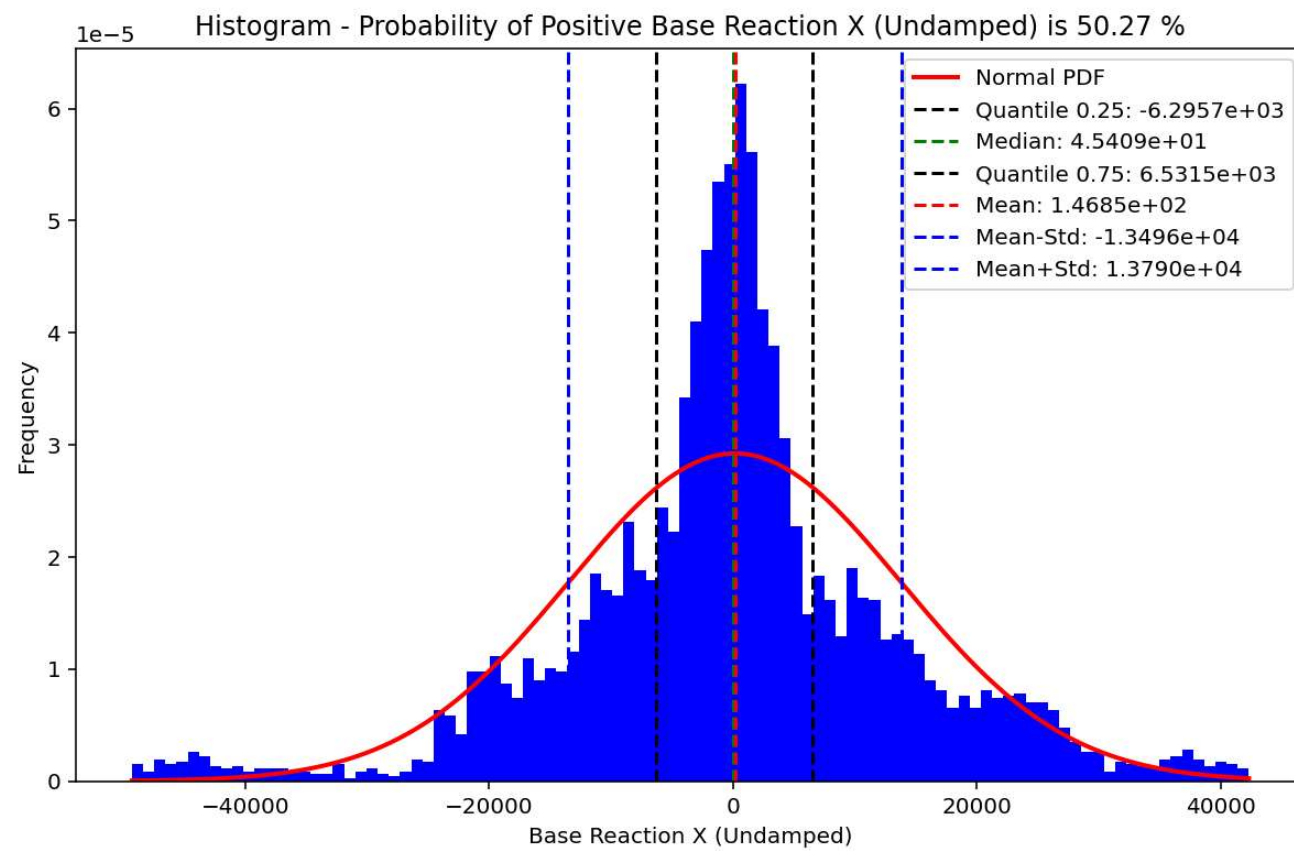


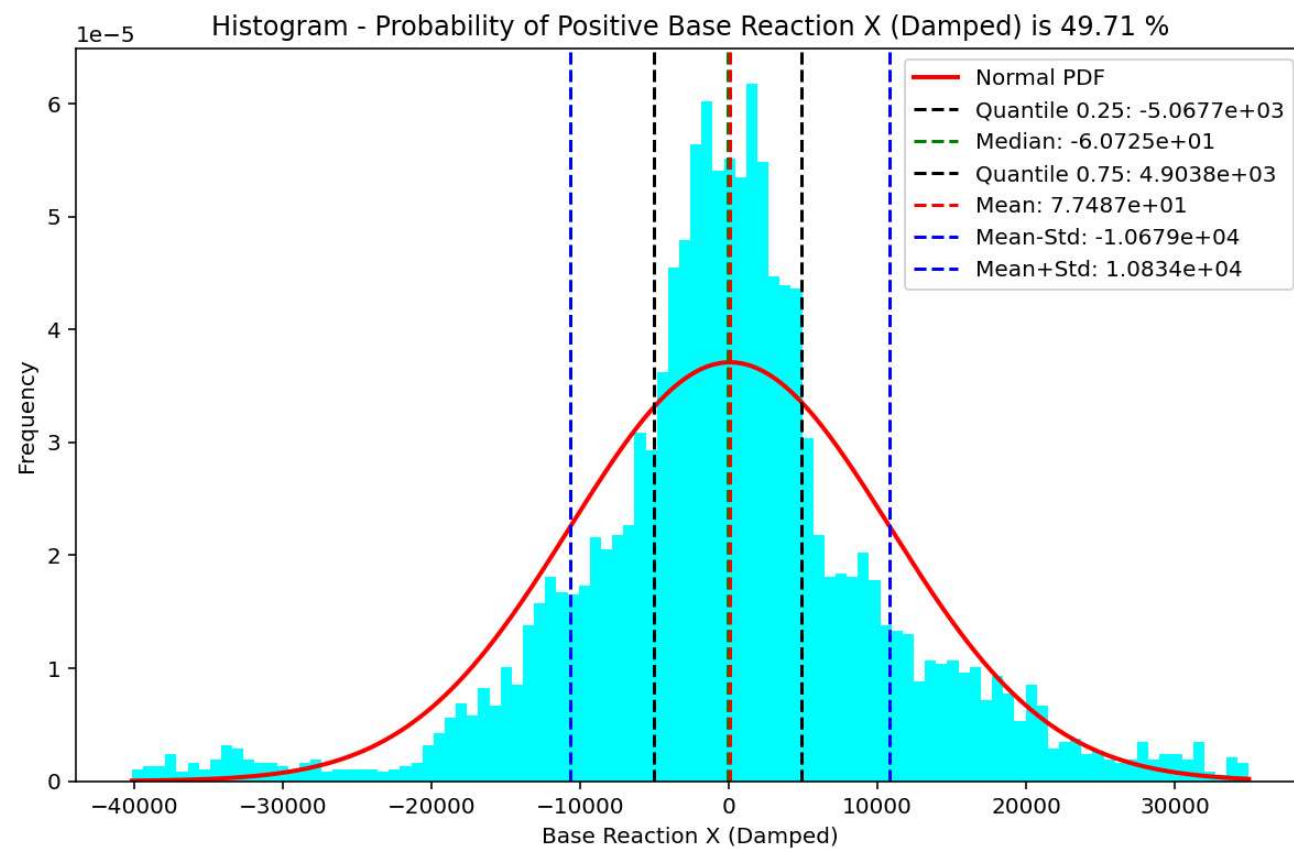


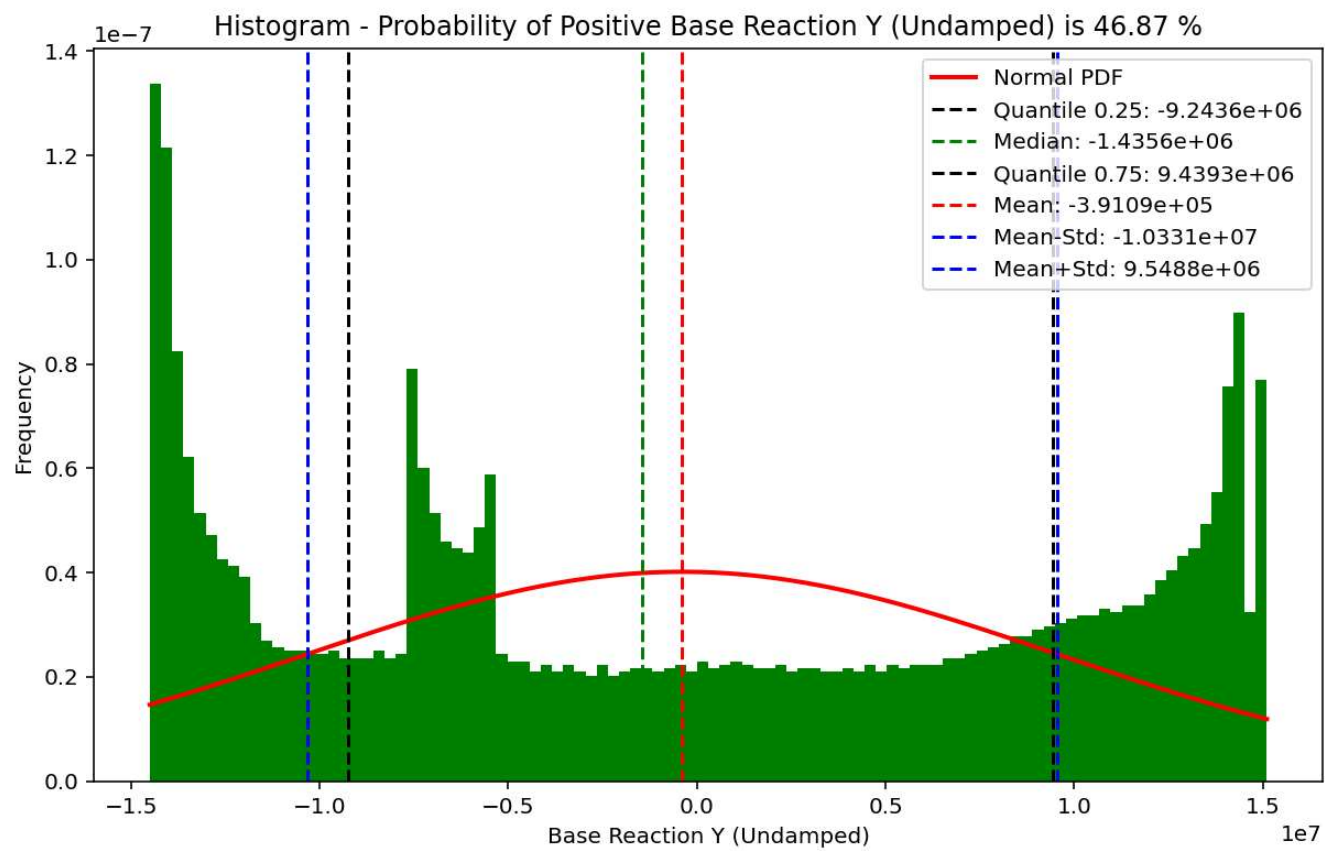


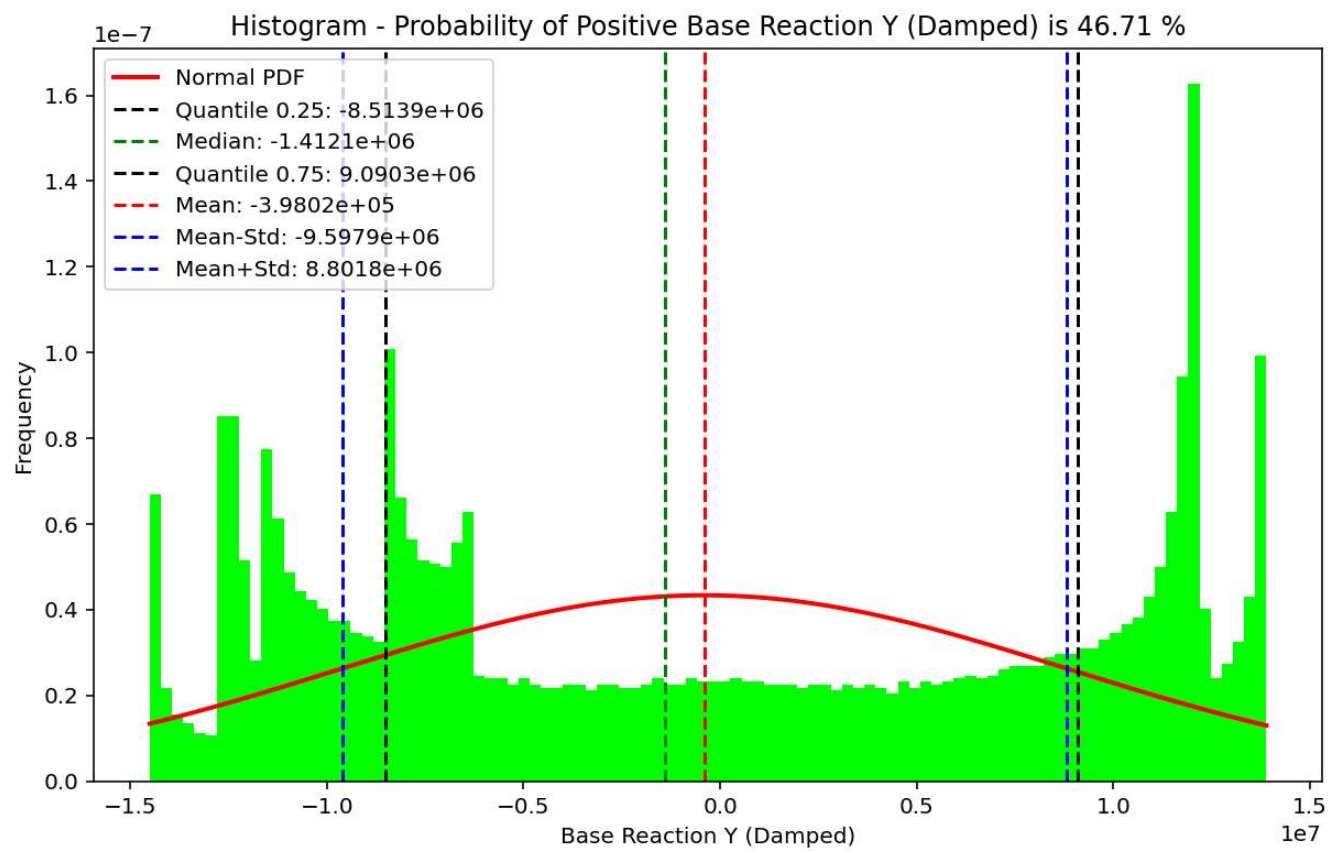






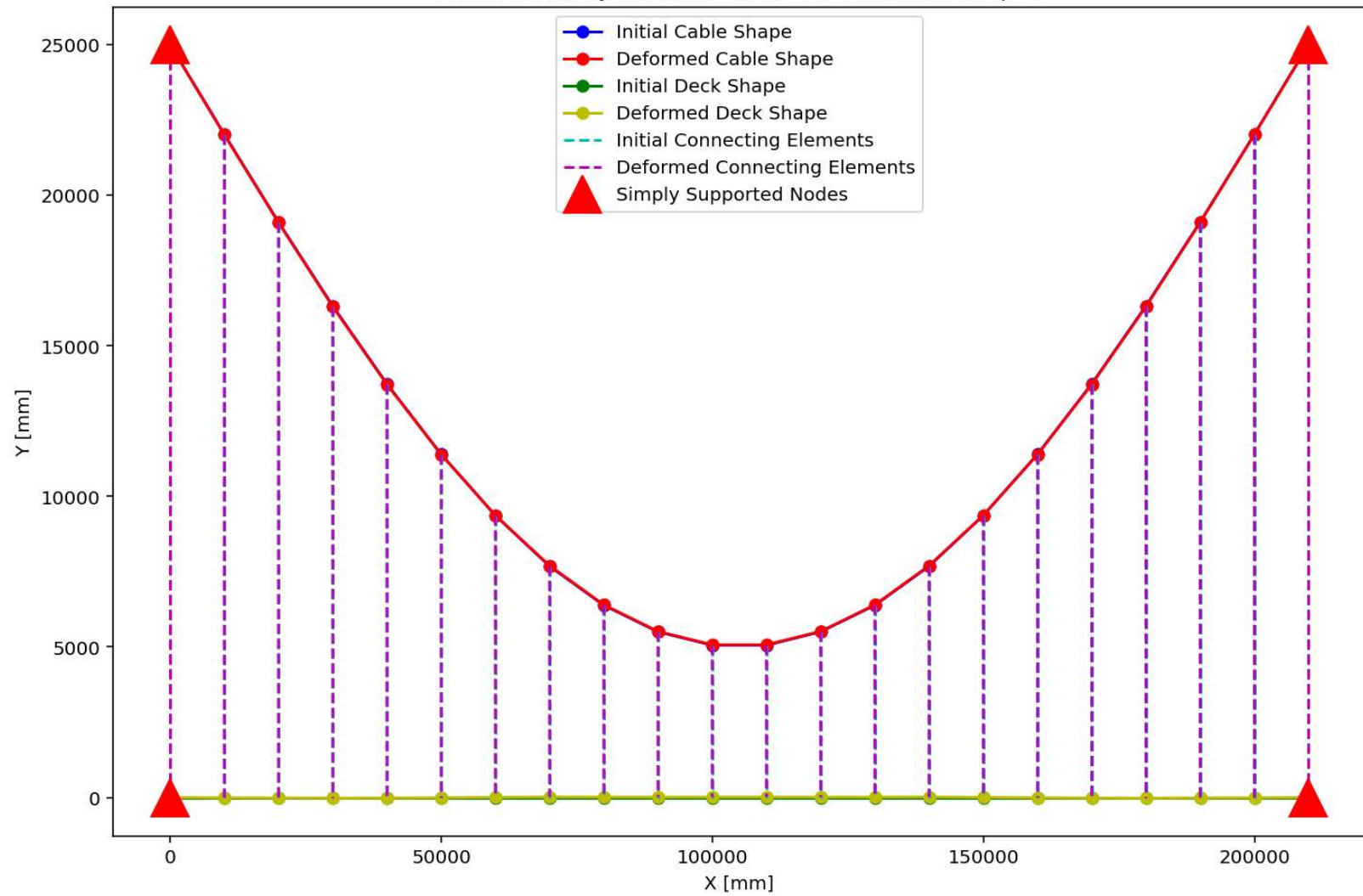


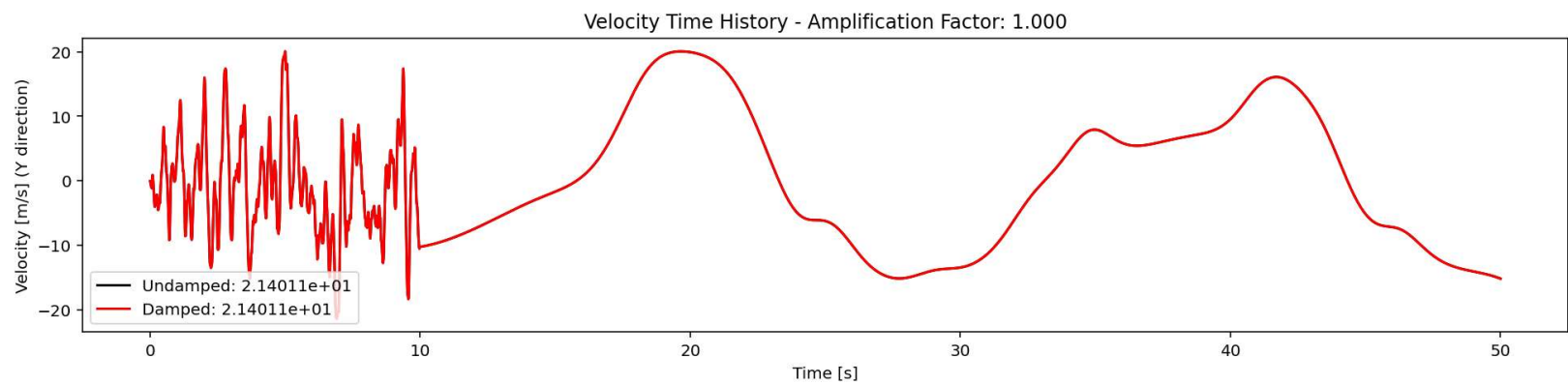
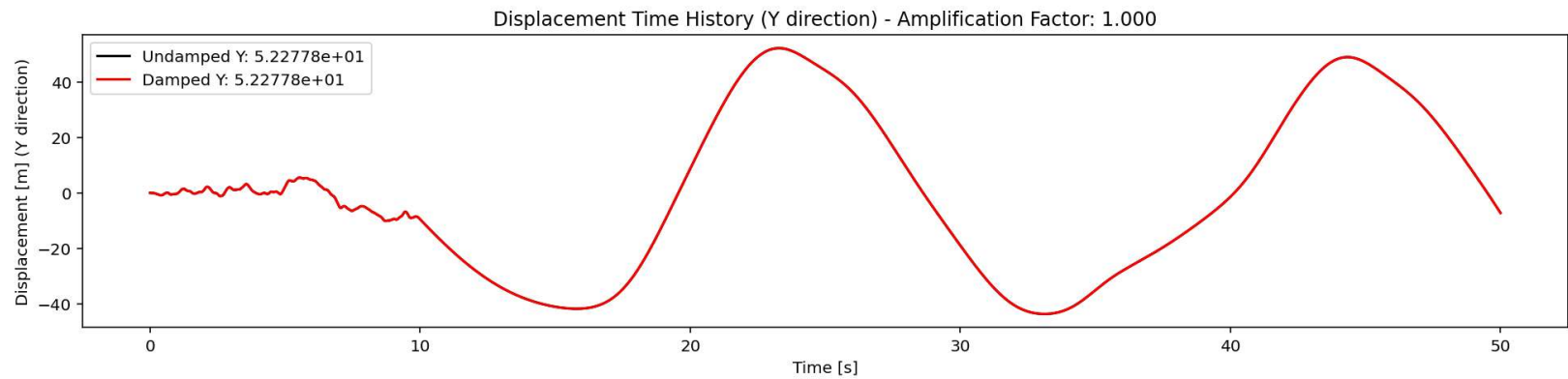
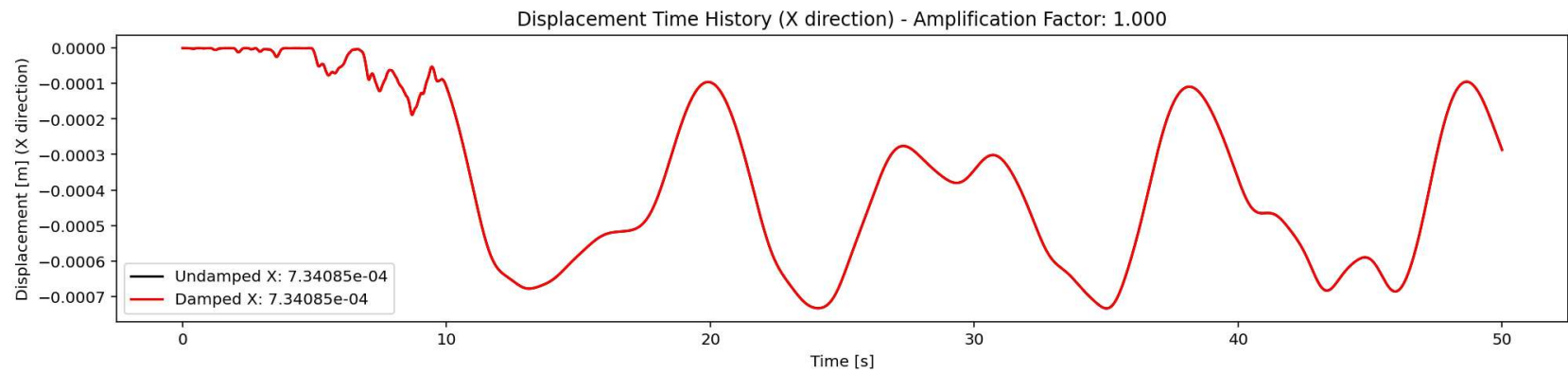


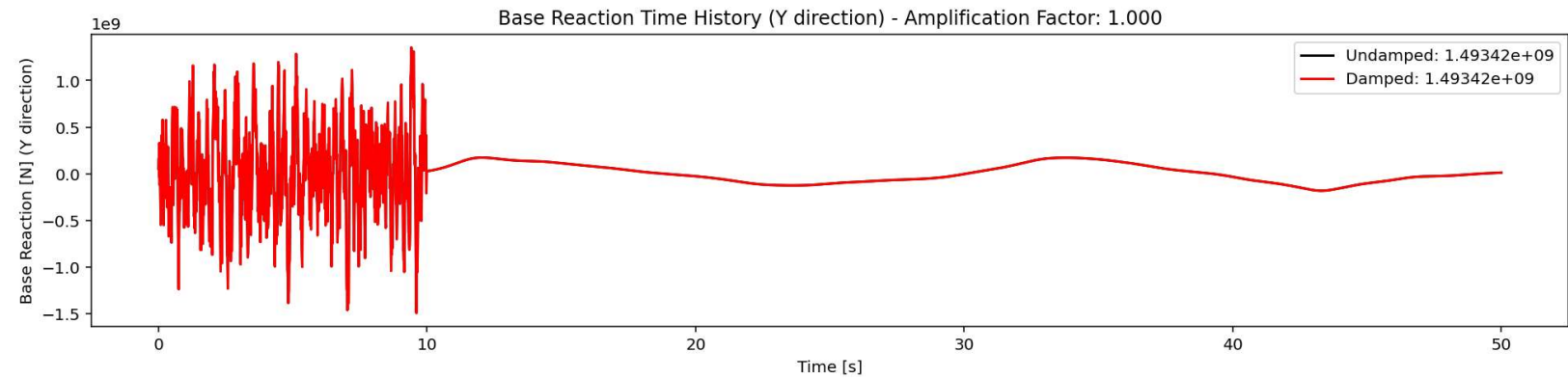
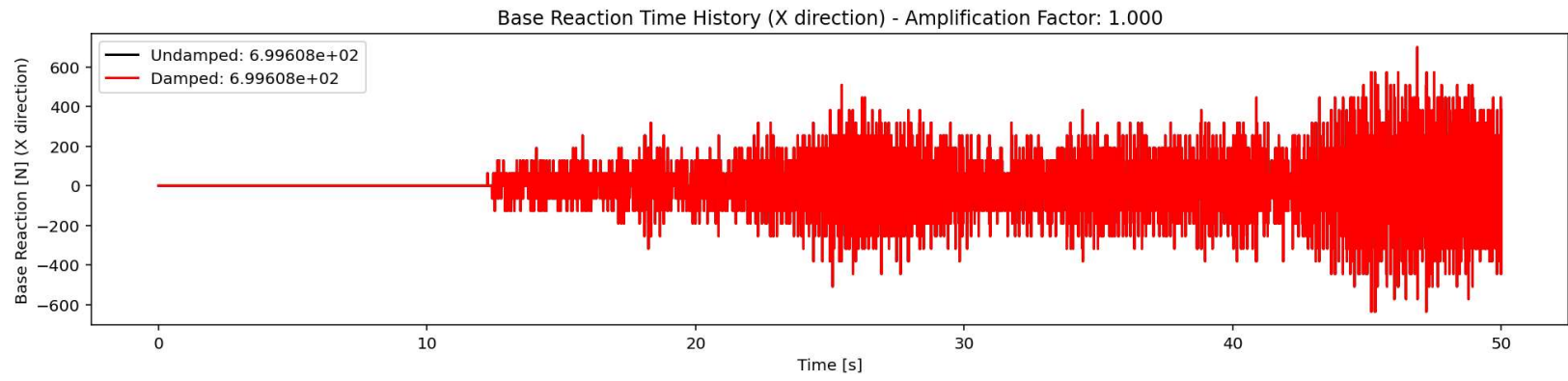
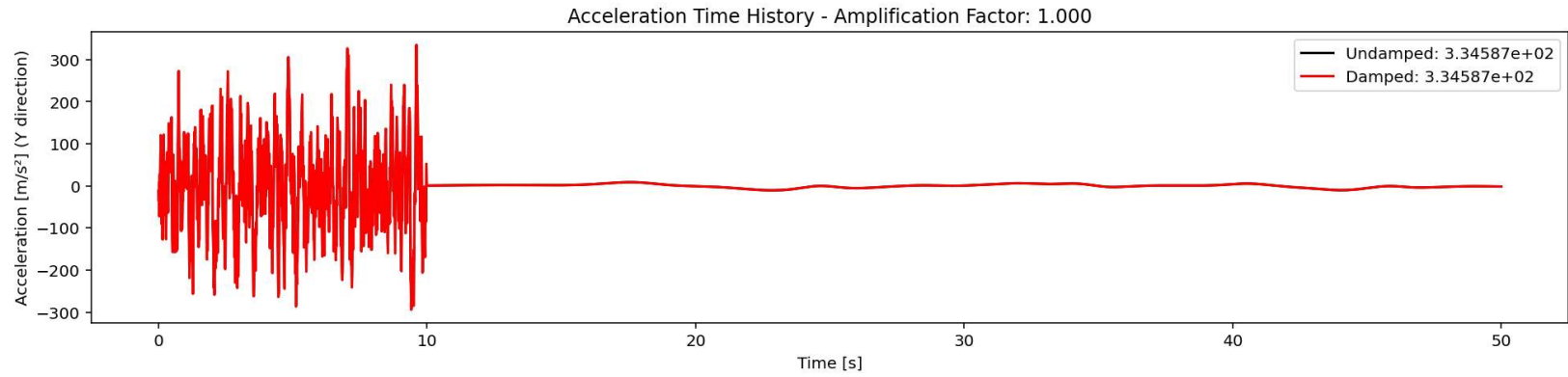


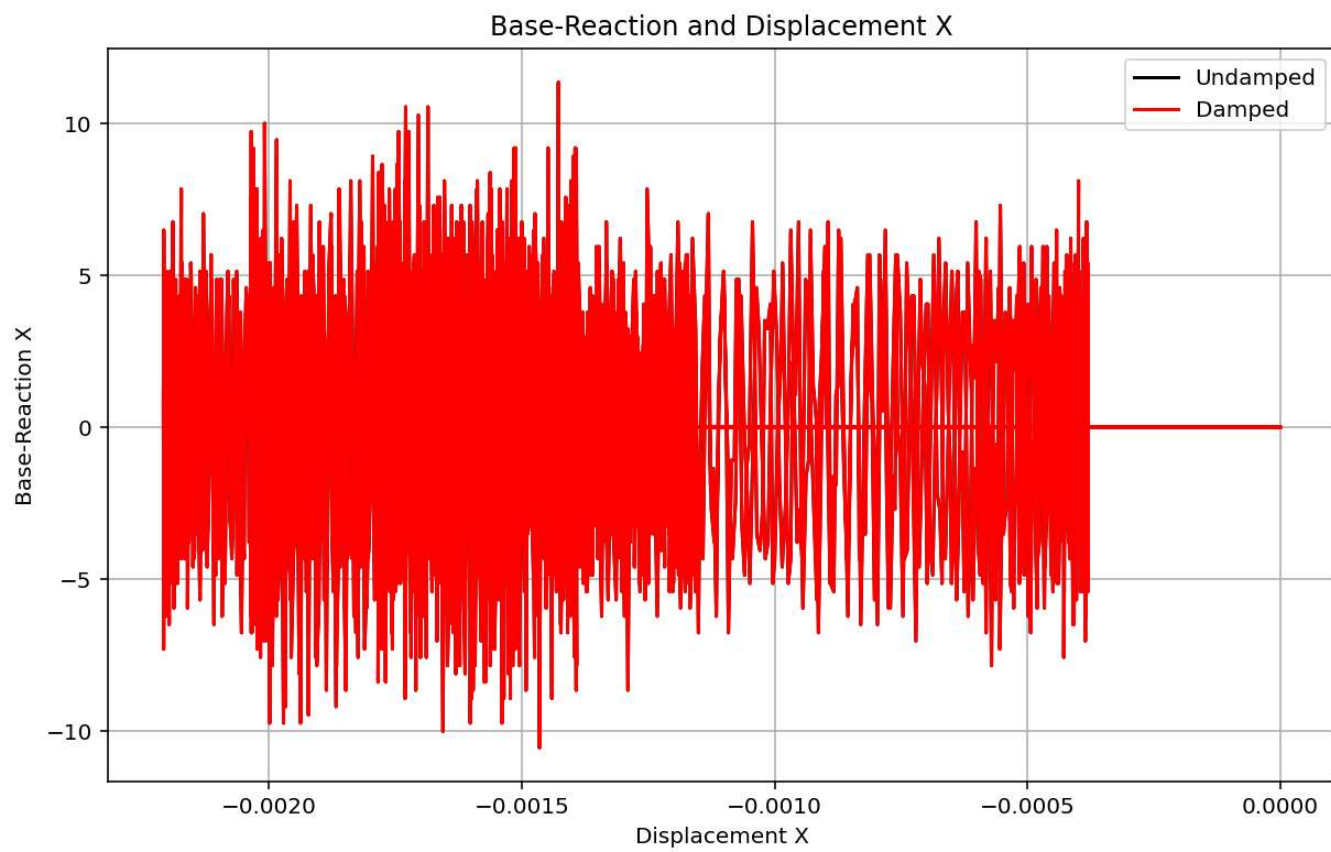
DYNAMIC ANALYSIS

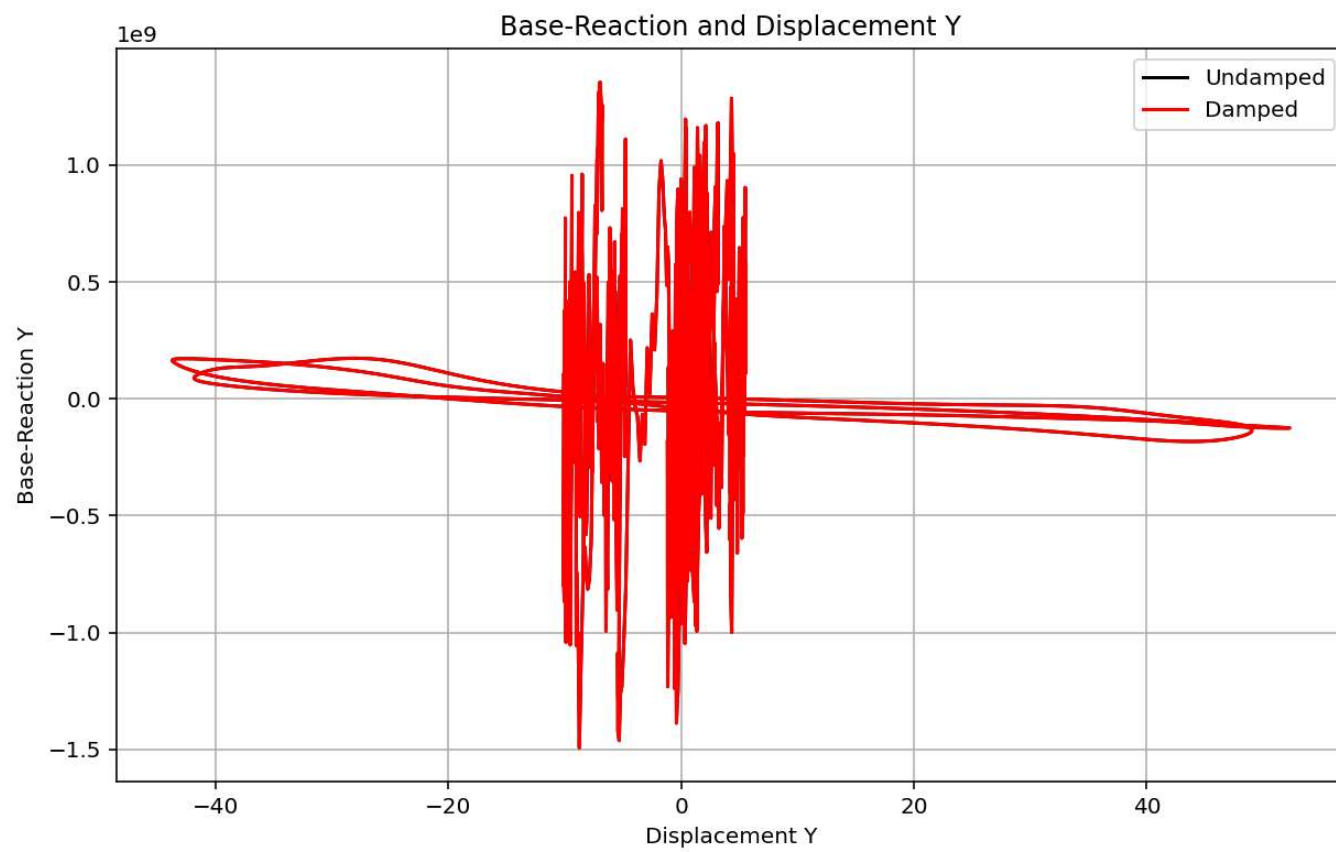
Pushover Analysis: Cable and Deck Deformed Shapes

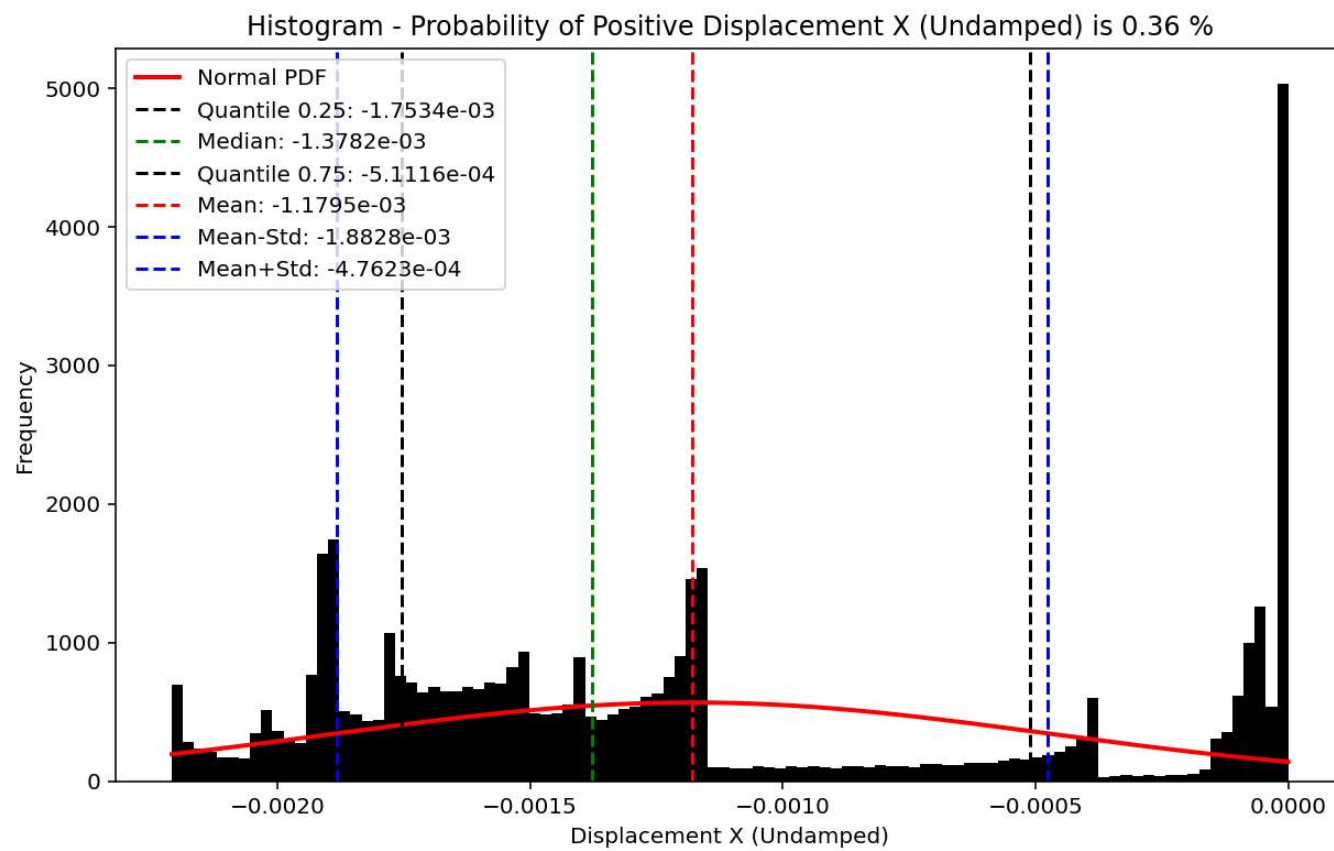


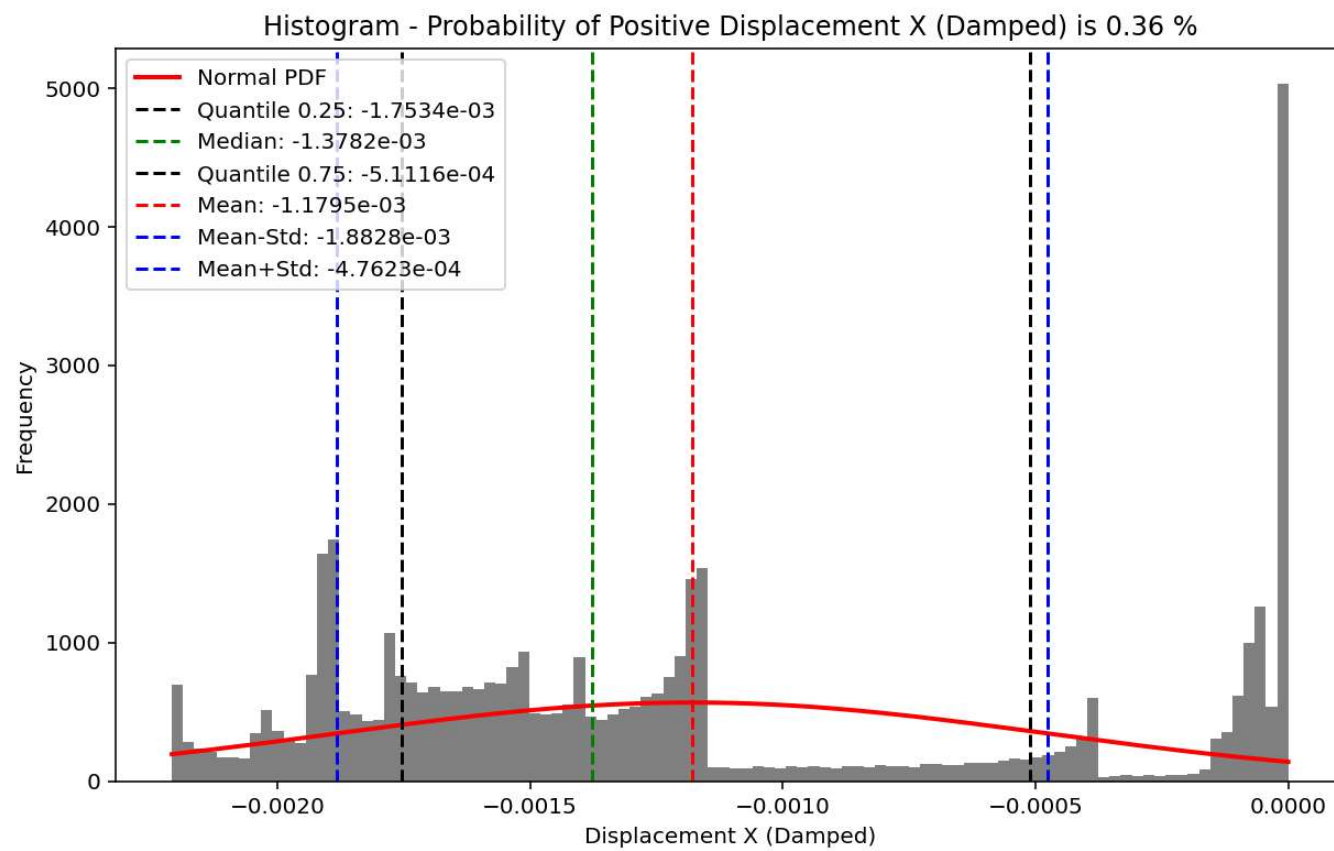


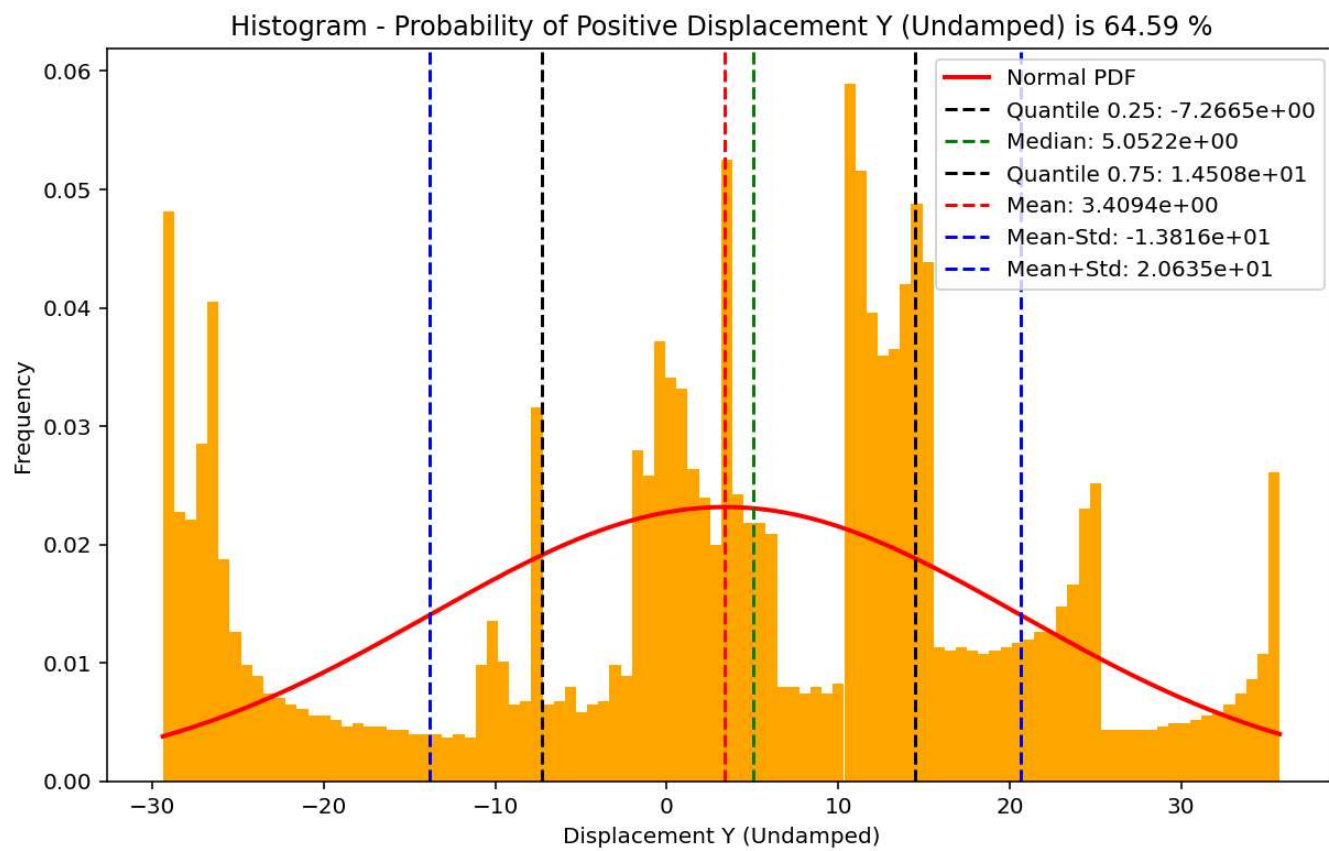


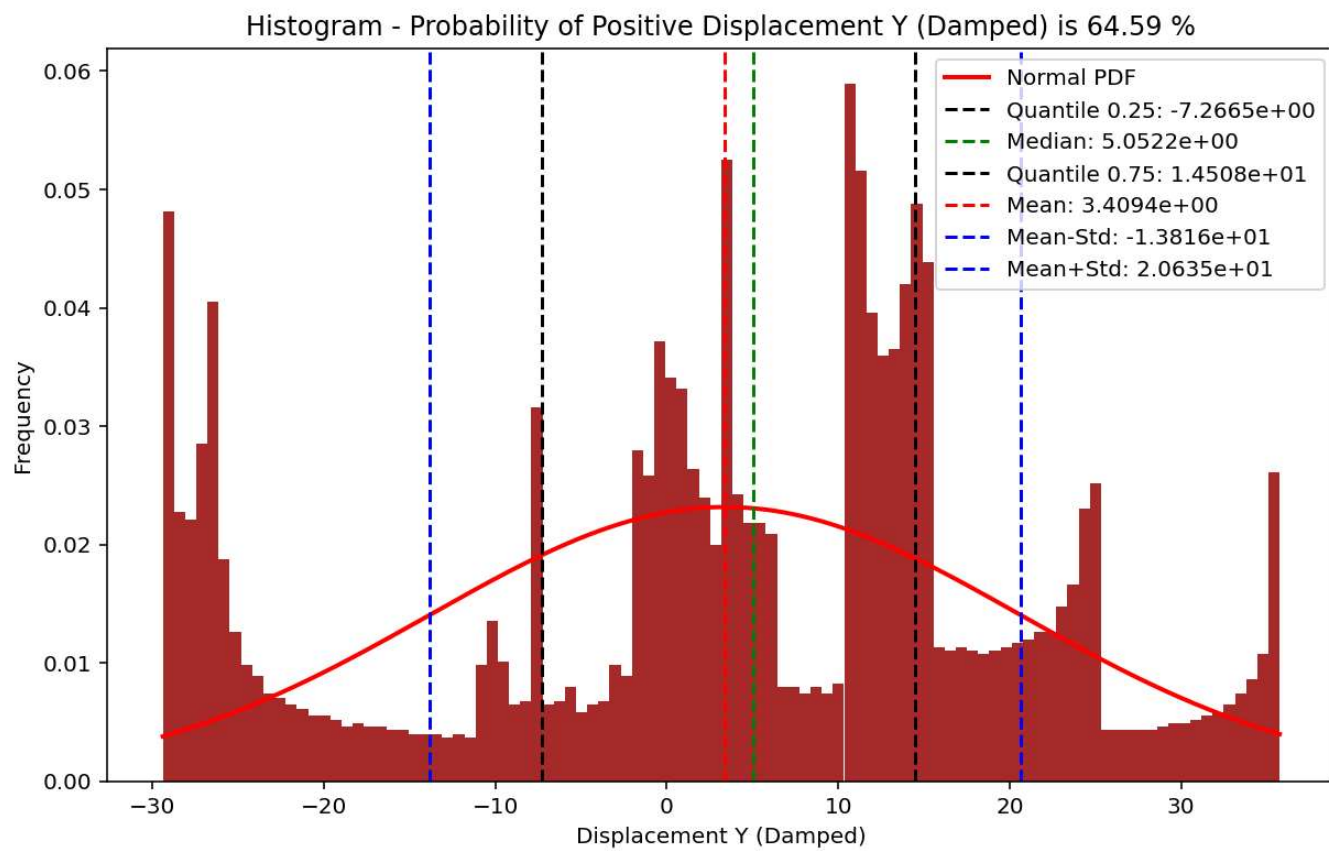




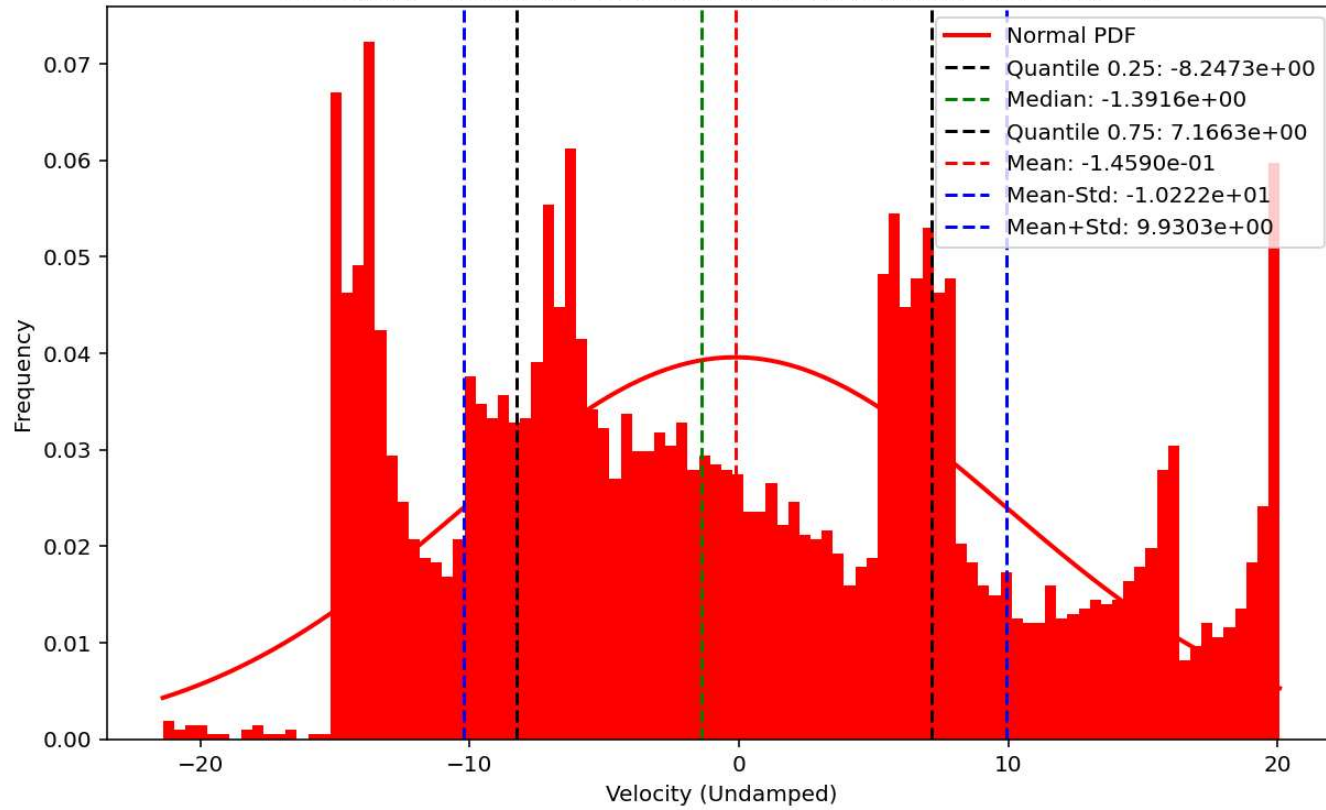




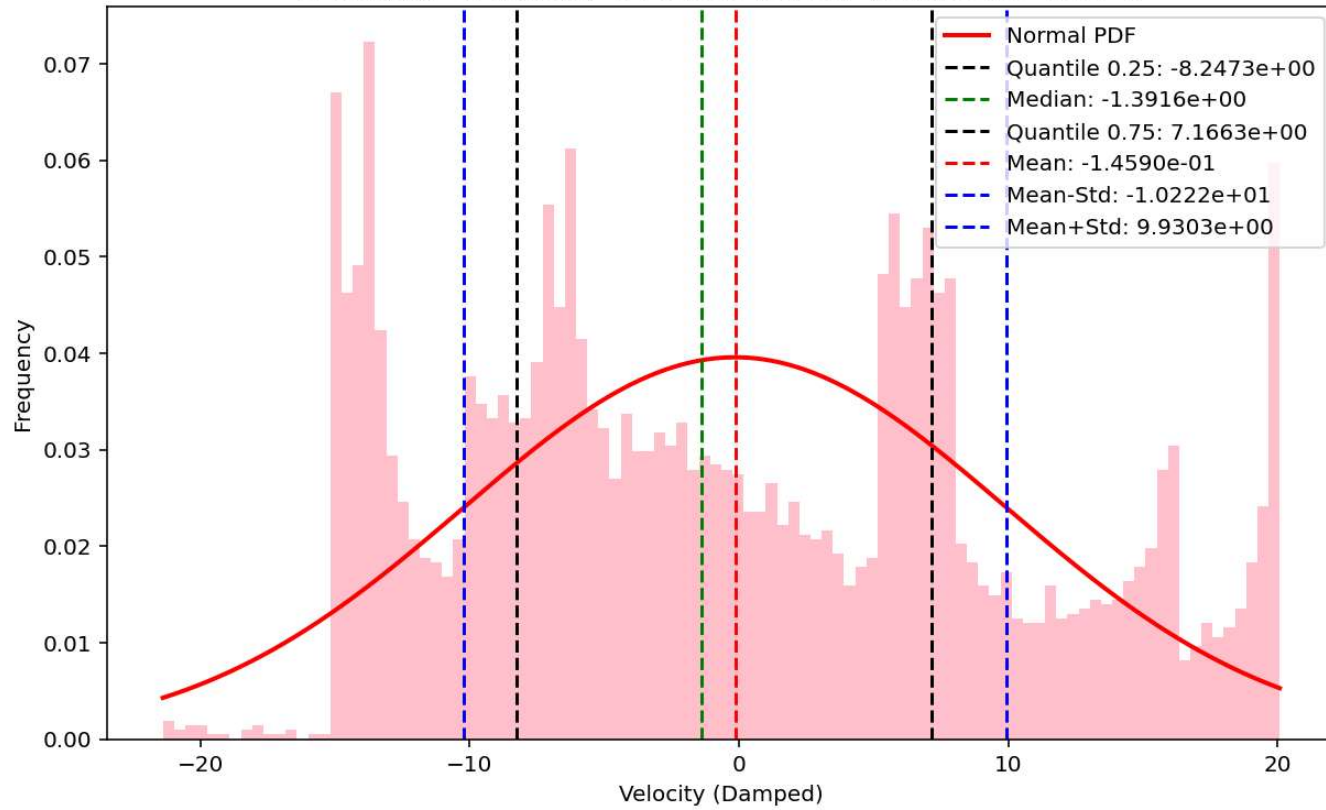




Histogram - Probability of Positive Velocity (Undamped) is 46.03 %



Histogram - Probability of Positive Velocity (Damped) is 46.03 %



Histogram - Probability of Positive Base Reaction X (Undamped) is 38.75 %

