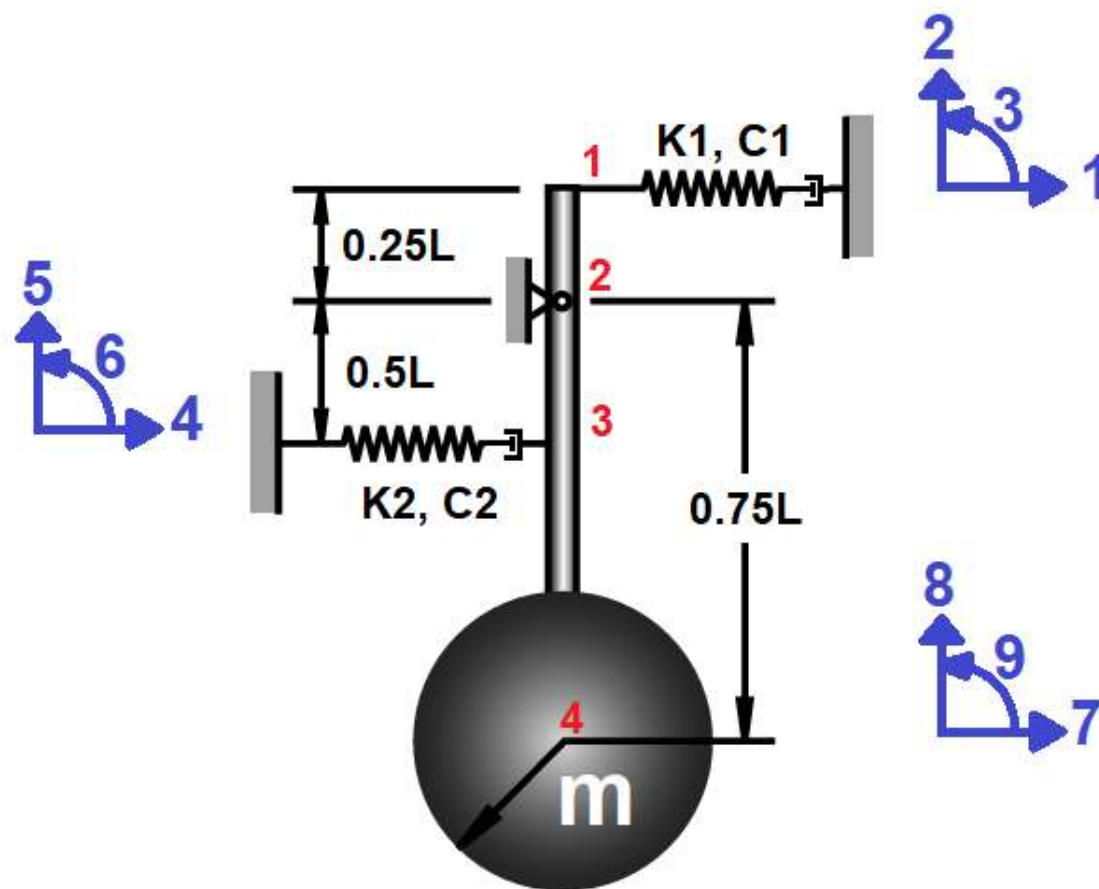


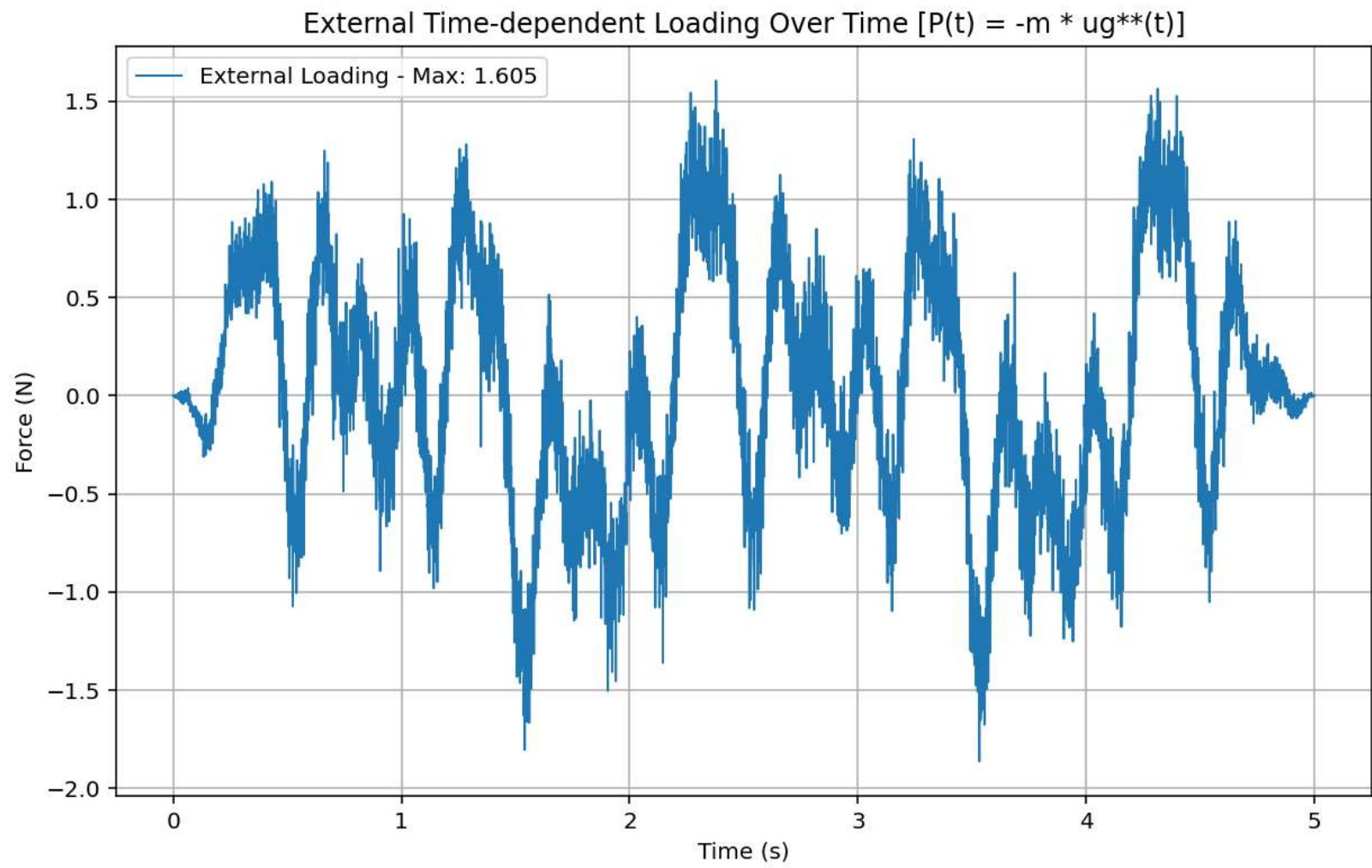
>> IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL <<

MODELING OF PENDULUM MDOF STRUCTURE USING OPENSEES

WRITTEN BY SALAR DELAVAR GHASHGHAEI (QASHQAI)



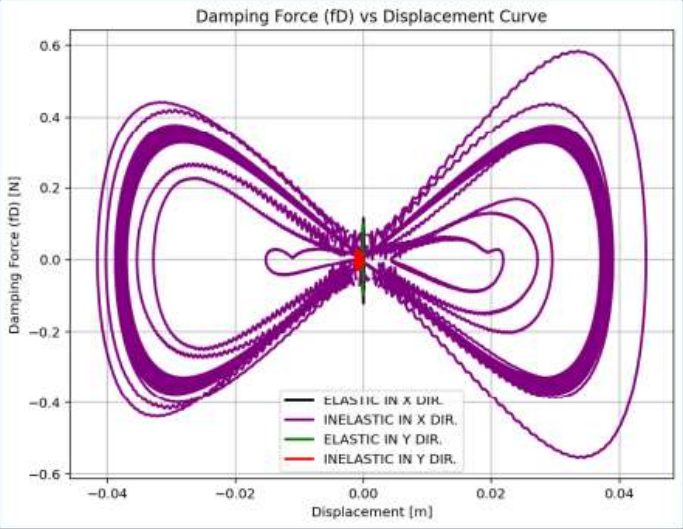
$$P(t) = -m\ddot{u}_g(t)$$



1#####
2#>> IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL <<
3#MODELING OF PENDULUM MDOF STRUCTURE USING OPENSEES
4#P(t) = -m * ug**(t)
5#-----
6#EVALUATION OF DAMPING FORCE (fD), SPRING FORCE (fS) AND INERTIA FORCE (
7#-----
8#THIS PROGRAM WRITTEN BY SALAR DELAVAR GHASHGHAEI (QASHQAI)
9#EMAIL: salar.d.ghashghaei@gmail.com
10#####
11""
12Performs time-dependent loading analysis of a Multi Degree of Freedom (MDOF)
13structure using OpenSeesPy, comparing elastic and inelastic spring behavior.
14Key features include:
15
161. Implements both elastic (linear) and hysteretic (nonlinear) material models for
17structural springs.
182. Supports initial conditions for displacement, velocity, and acceleration.
193. Uses Newmark's method for time integration with Newton-Raphson iteration.
204. Calculates damping ratios using logarithmic decrement from response peaks.
215. Generates force-displacement backbone curves for inelastic material.
226. Tracks and plots time-history responses (displacement, velocity, acceleration, reactions
237. Compares elastic vs inelastic system performance.
248. Includes convergence checks and analysis stability monitoring.
259. Outputs model data in JSON format for post-processing.
2610. Provides theoretical validation through natural frequency calculations.
27
28Particularly useful for earthquake engineering applications,
29allowing evaluation of structural response under time-dependent loading
30with different material nonlinearities and damping characteristics.
31The hysteretic material model captures energy dissipation
32inelastic deformation, while the elastic case serves as a reference for linear behavior.
33-----
34This code performs nonlinear time-history analysis of a 2D moment-resisting frame

Options

Damping Force (fD) vs Displacement Curve



ELASTIC IN X DIR.
INELASTIC IN X DIR.
ELASTIC IN Y DIR.
INELASTIC IN Y DIR.

Python Console

Files

Help

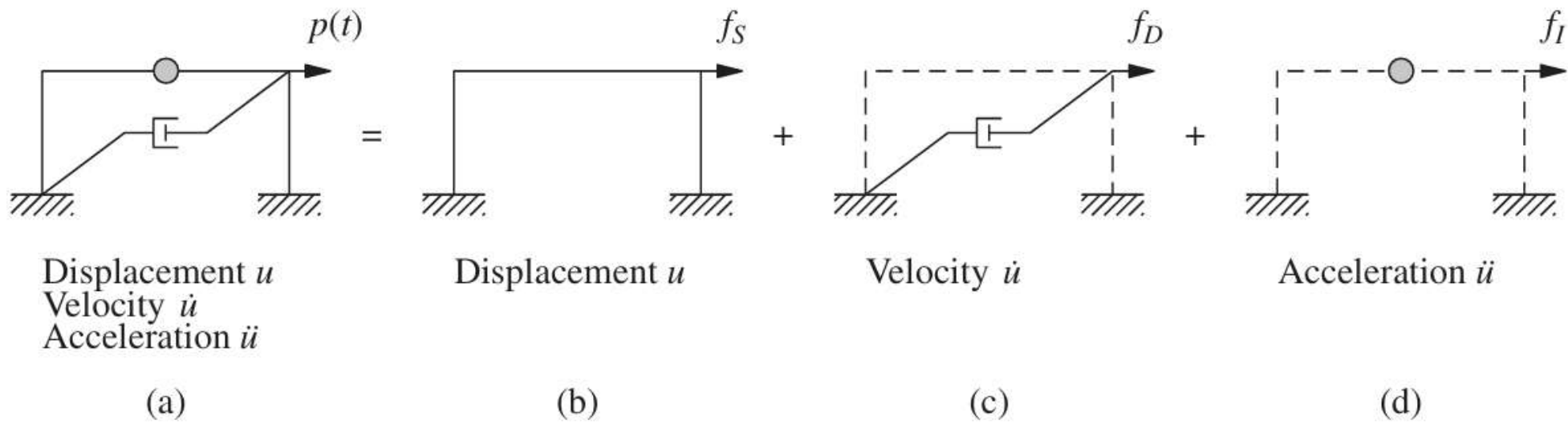
Variable Explorer

Debugger

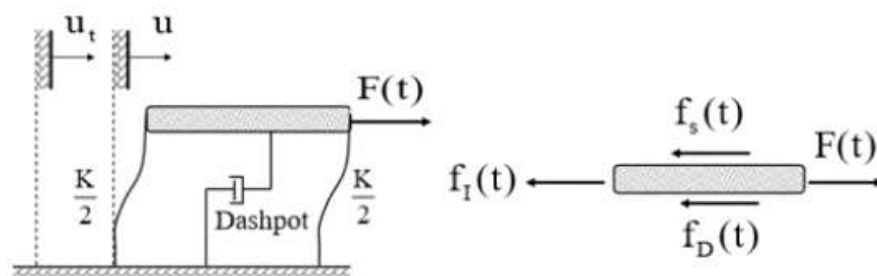
Plots

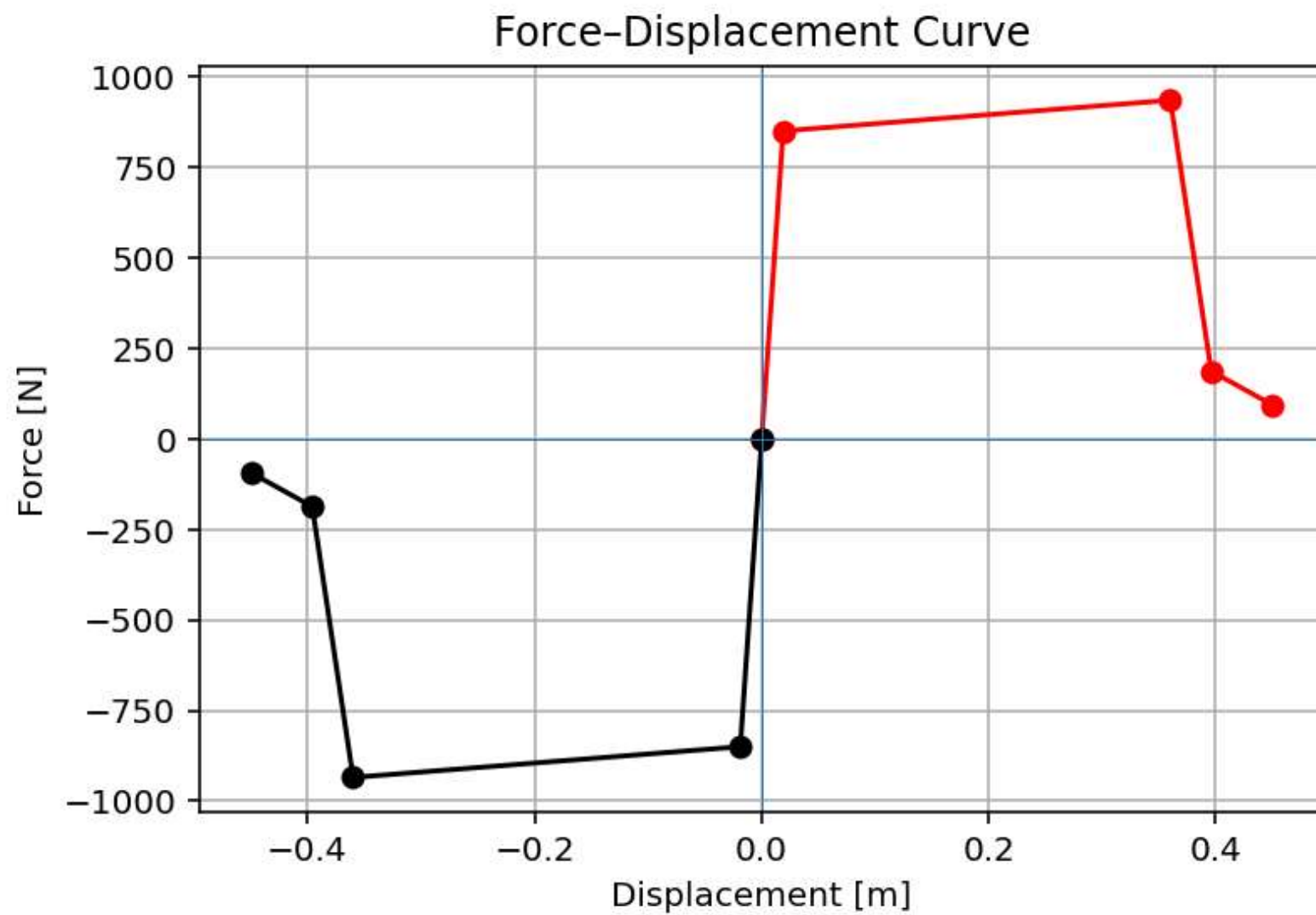
History

InlineConda: anaconda3 (Python 3.12.7) ✓LSP: PythonLine 250, Col 10UTF-8CRLF RWMem 33%

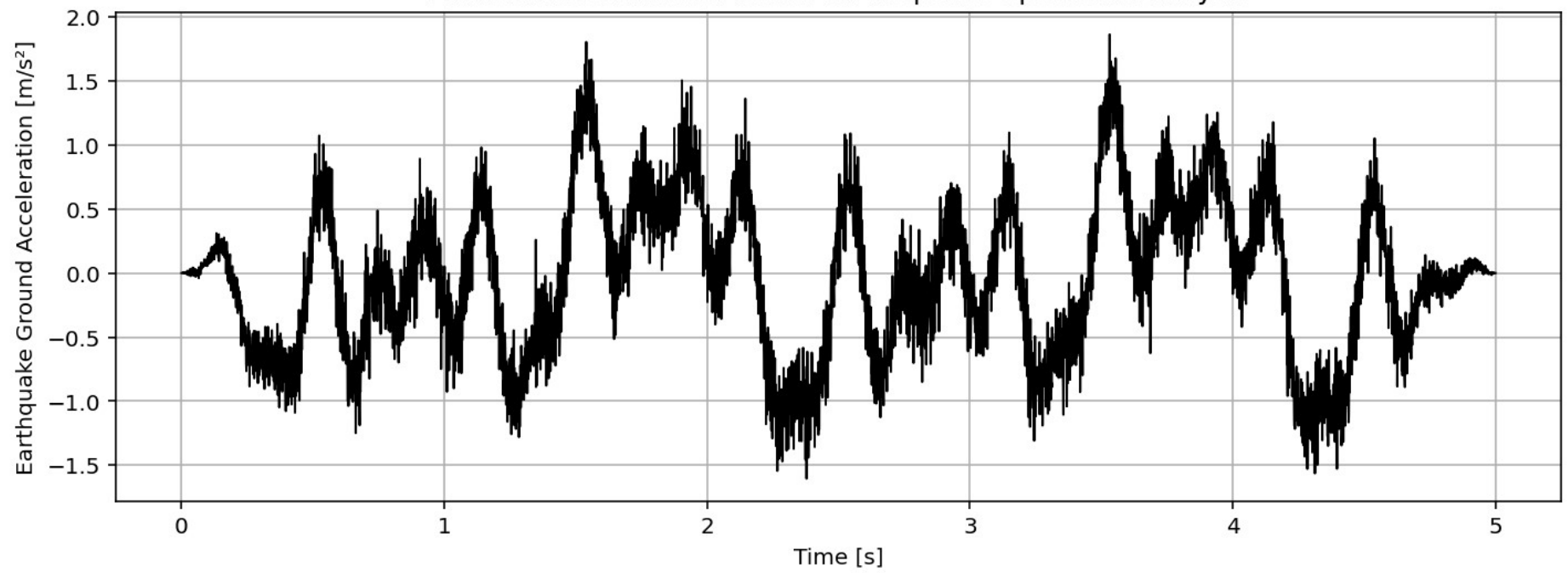


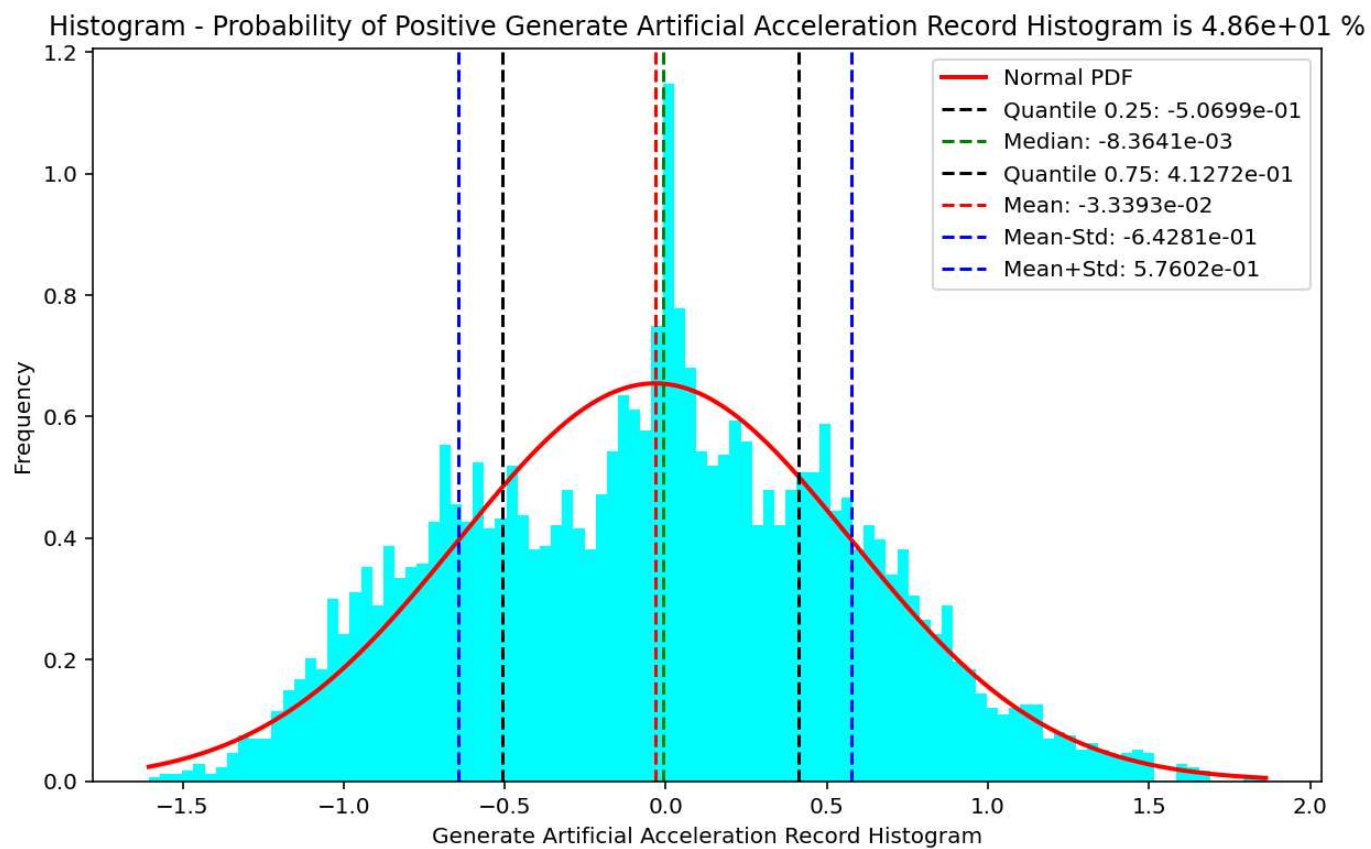
(a) System; (b) stiffness component; (c) damping component; (d) mass component.



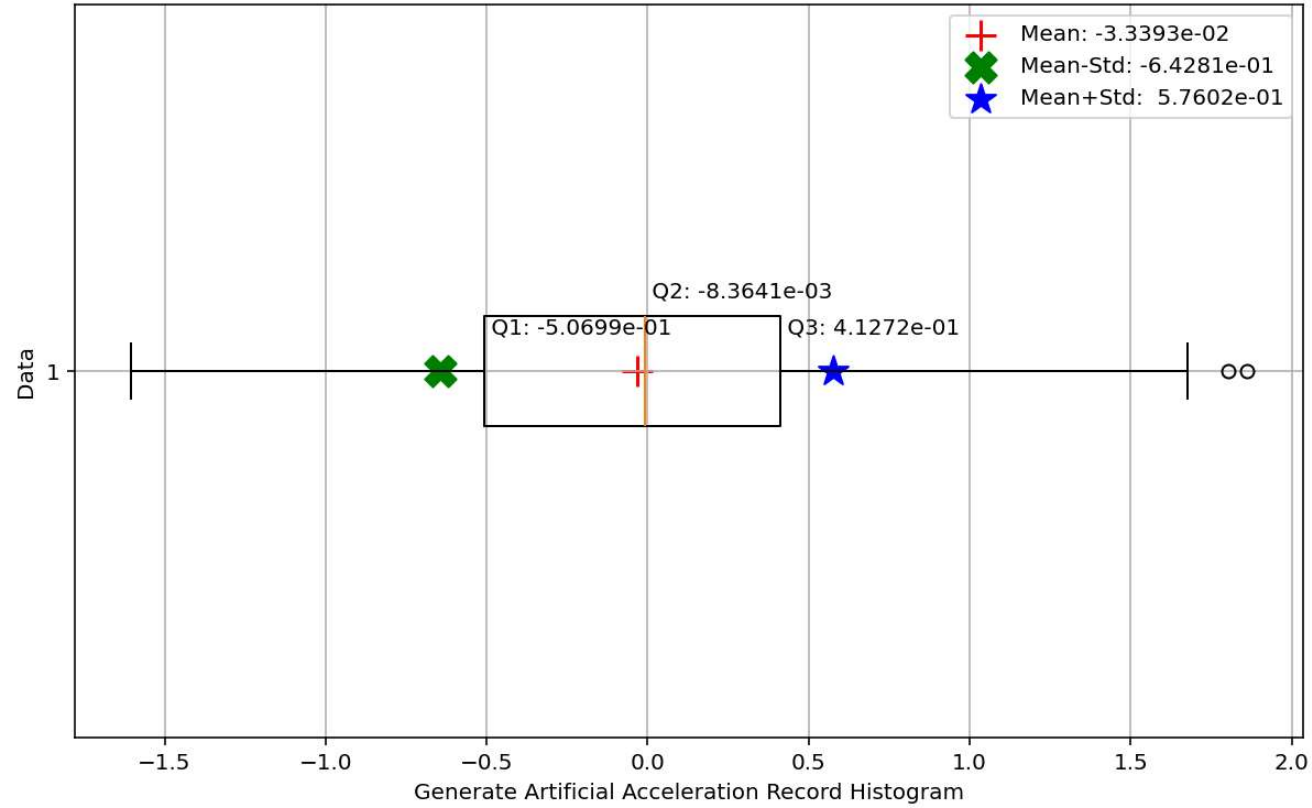


Artificial Acceleration Record for Response Spectrum Analysis

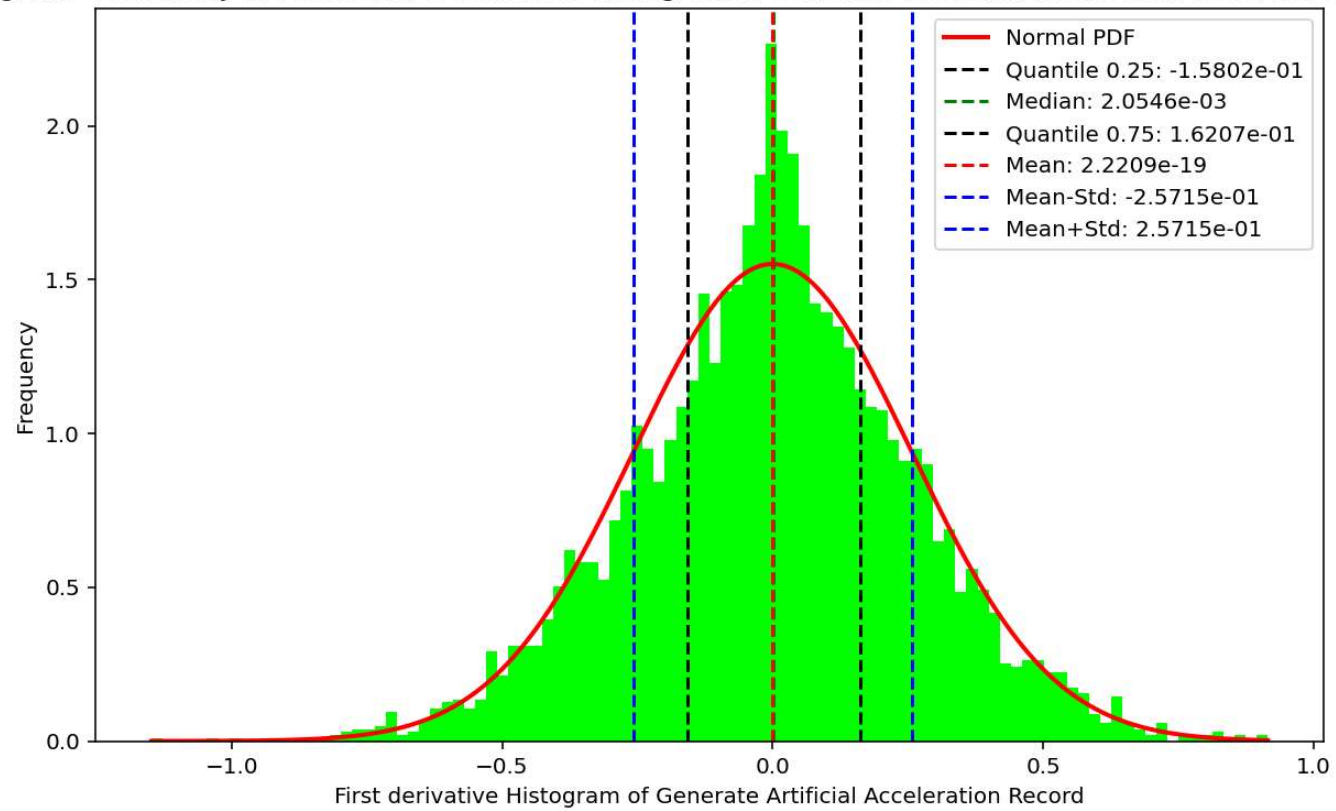


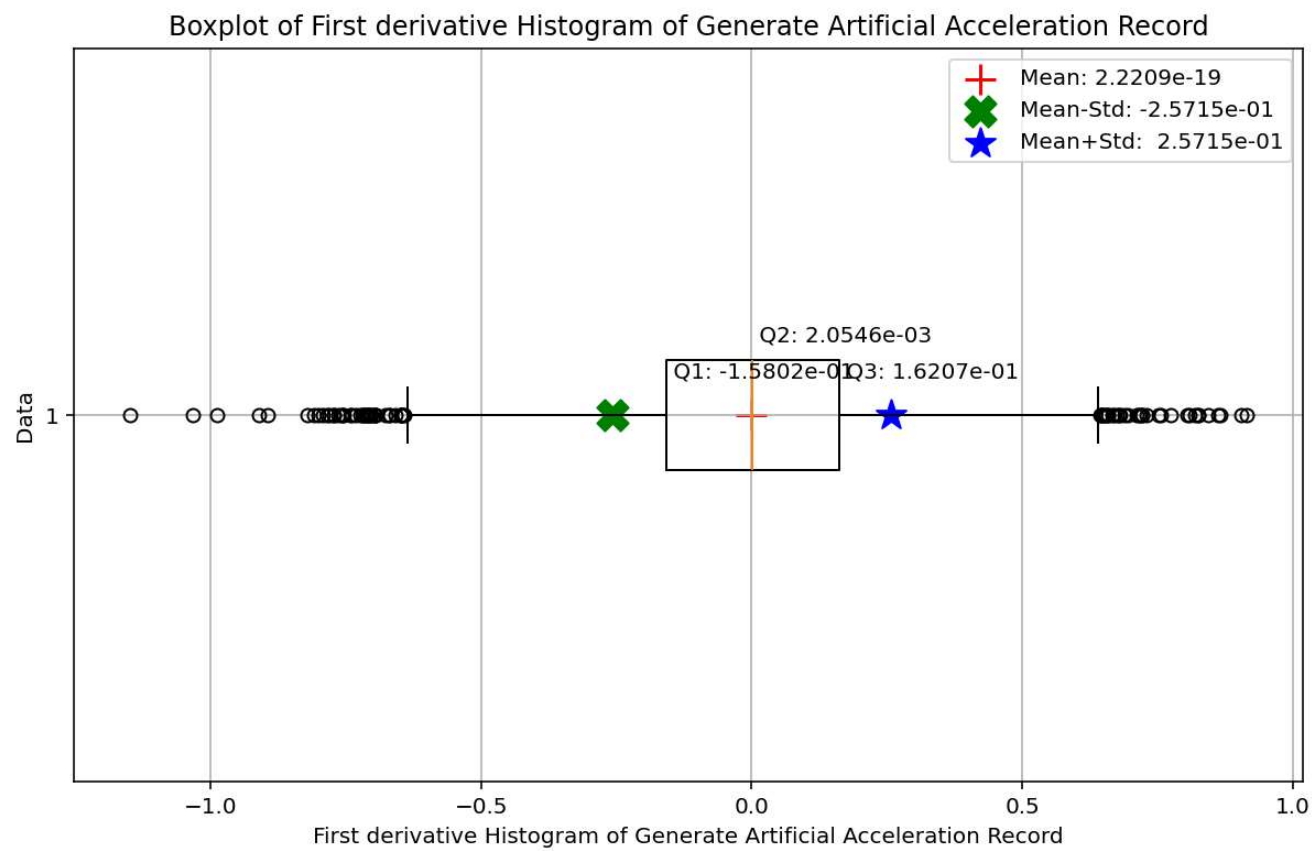


Boxplot of Generate Artificial Acceleration Record Histogram



Histogram - Probability of Positive First derivative Histogram of Generate Artificial Acceleration Record is 5.07e+01 %





Normalized Cumulative Absolute Acceleration

