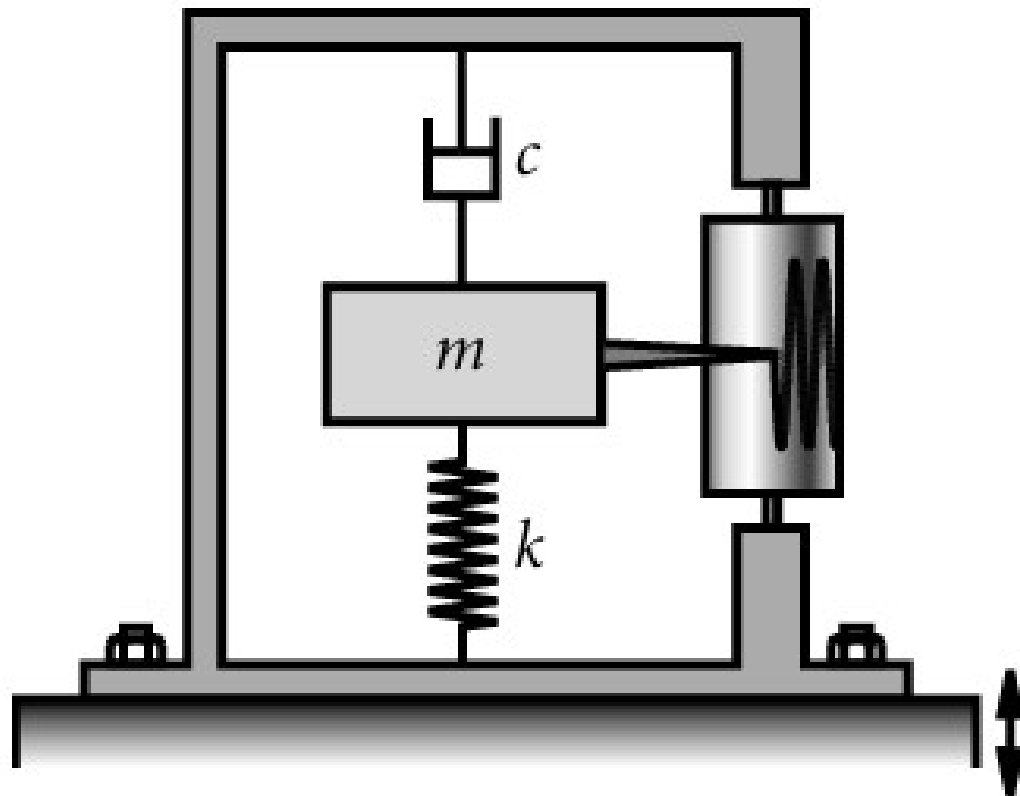


>> IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL <<

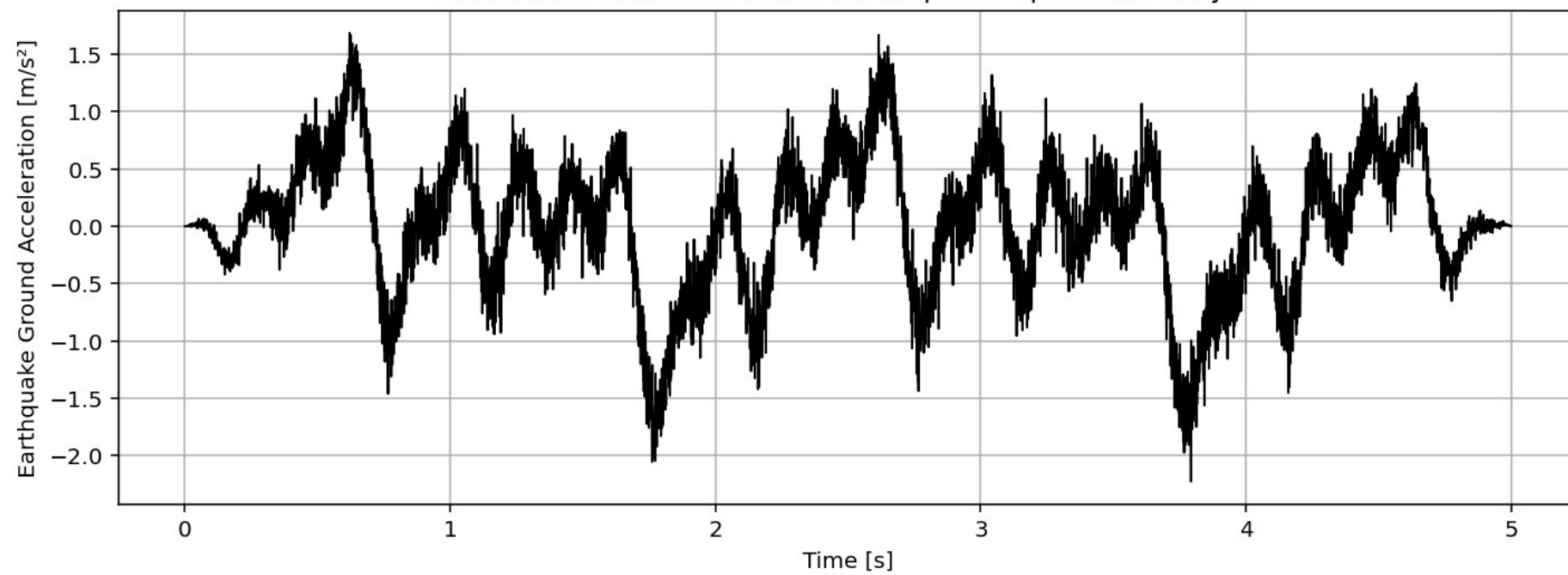
MODELING OF DISPLACEMENT METER FOR SDOF STRUCTURE USING OPENSEES

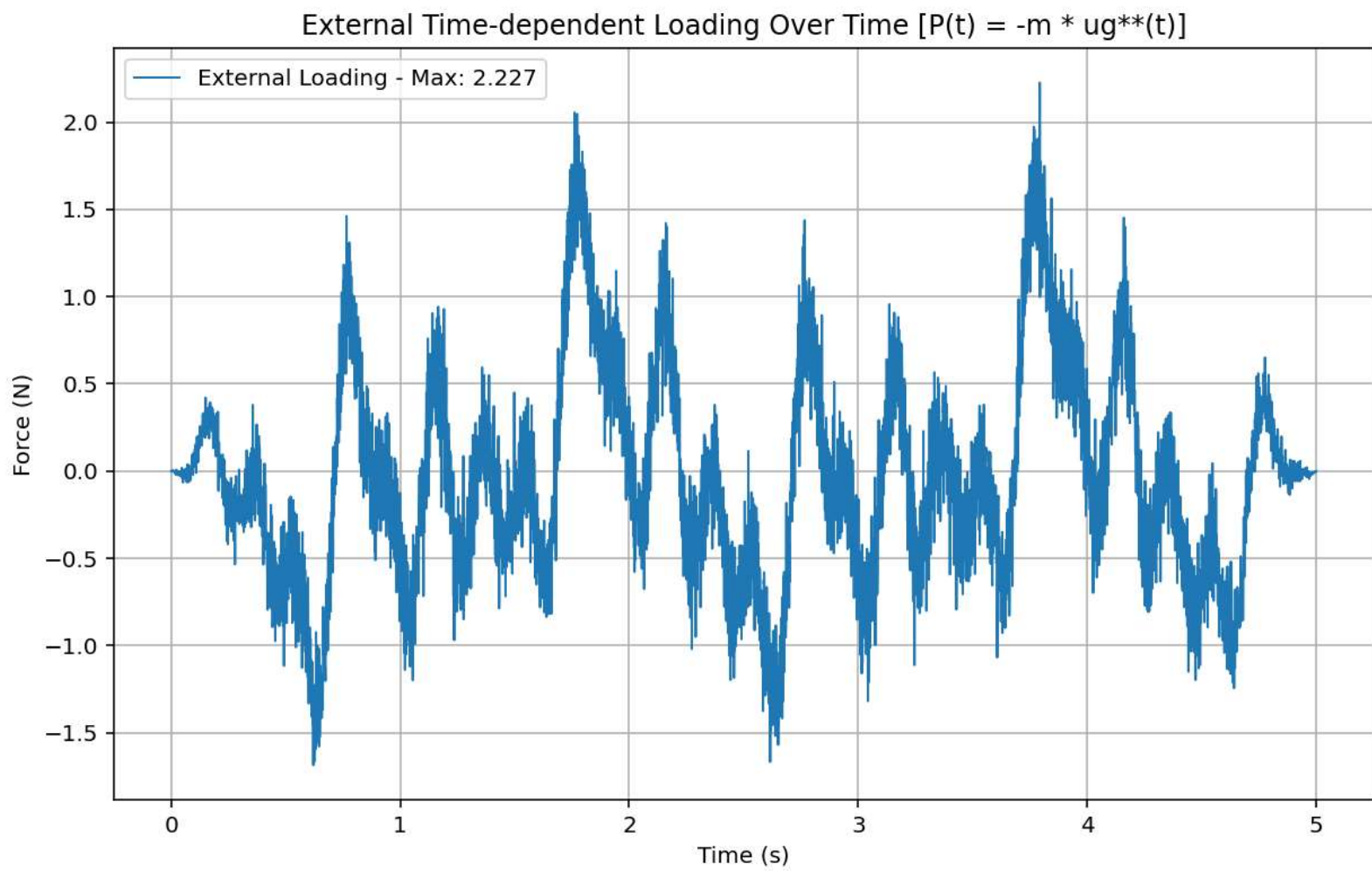
WRITTEN BY SALAR DELAVAR GHASHGHAEI (QASHQAI)



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

Artificial Acceleration Record for Response Spectrum Analysis





Spyder (Python 3.12)

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C:\Users\Dell\Desktop\OPENSEES_FILES\+DISPLACEMENT_METER

C:\Users\Dell\Desktop\OPENSEES_FILES\+DISPLACEMENT_METER\DISPLACEMENT_METER_TWO.py

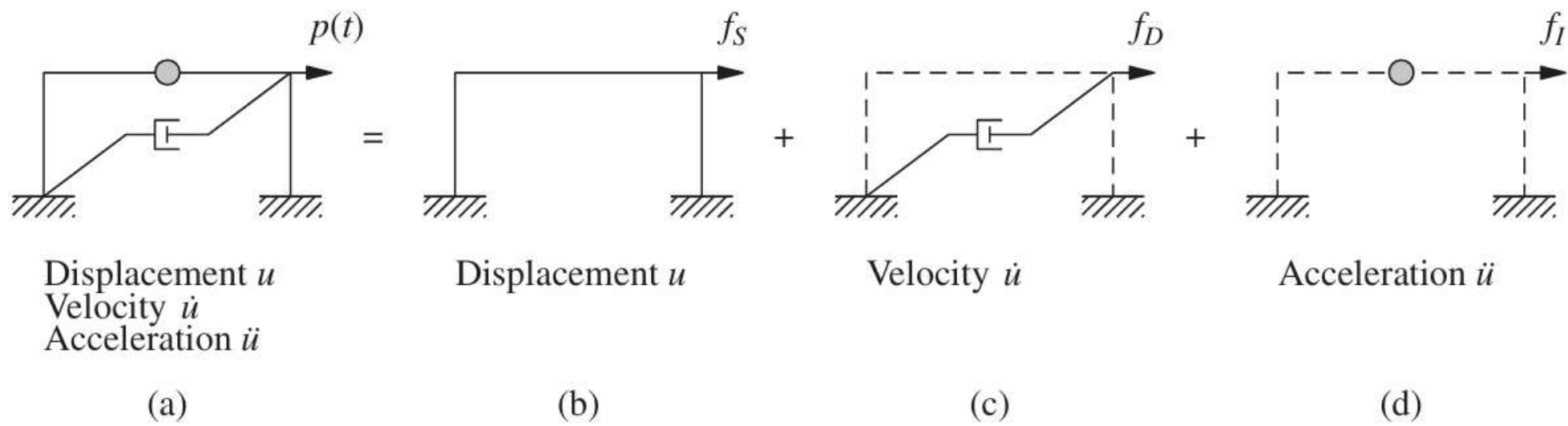
DISPLACEMENT_METER_TWO.py

```
1 #####
2 # >> IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL <
3 # MODELING OF DISPLACEMENT METER SDOF STRUCTURE USING OPENSEES
4 #  $P(t) = -m * \ddot{u}_g(t)$ 
5 # -----
6 # EVALUATION OF DAMPING FORCE (fD), SPRING FORCE (fS) AND INERTIA FORCE
7 # -----
8 # THIS PROGRAM WRITTEN BY SALAR DELAVAR GHASHGHAEE (QASHQAI)
9 # EMAIL: salar.d.ghashghaei@gmail.com
10 #####
11 """
12 Performs time-dependent loading analysis of a Single Degree of Freedom (SDOF)
13 structure using OpenSeesPy, comparing elastic and inelastic spring behavior.
14 Key features include:
15
16 1. Implements both elastic (linear) and hysteretic (nonlinear) material models for
17 structural springs.
18 2. Supports initial conditions for displacement, velocity, and acceleration.
19 3. Uses Newmark's method for time integration with Newton-Raphson iteration.
20 4. Calculates damping ratios using logarithmic decrement from response peaks.
21 5. Generates force-displacement backbone curves for inelastic material.
22 6. Tracks and plots time-history responses (displacement, velocity, acceleration, reaction
23 7. Compares elastic vs inelastic system performance.
24 8. Includes convergence checks and analysis stability monitoring.
25 9. Outputs model data in JSON format for post-processing.
26 10. Provides theoretical validation through natural frequency calculations.
27
28 Particularly useful for earthquake engineering applications,
29 allowing evaluation of structural response under time-dependent loading
30 with different material nonlinearities and damping characteristics.
31 The hysteretic material model captures energy dissipation
32 inelastic deformation, while the elastic case serves as a reference for linear behavior.
33 """
34 import openseespy.opensees as ops
```

Damping Force (fD) vs Displacement Curve

IPython Console Files Help Variable Explorer Debugger Plots History

Inline Conda: anaconda3 (Python 3.12.7) ✓ LSP: Python Line 459, Col 57 UTF-8 CRLF RW Mem 34%



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

