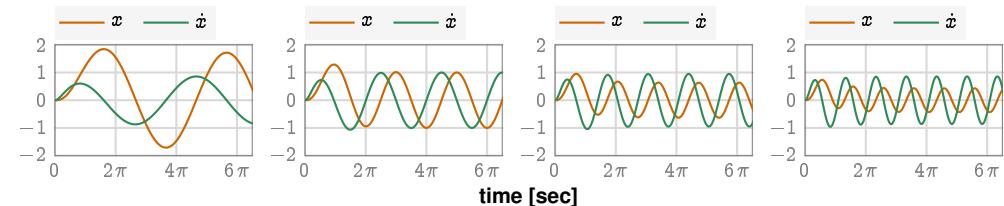


The $\gamma(\Delta)$ Plots As a Frequency-like Analytic Tool For Complex Systems

a. Linear System

$$2.5\dot{x} + x = 2.5 \sin(\omega t)$$

$$\omega = [0.5 \quad 1.0 \quad 1.5 \quad 2.0.]$$

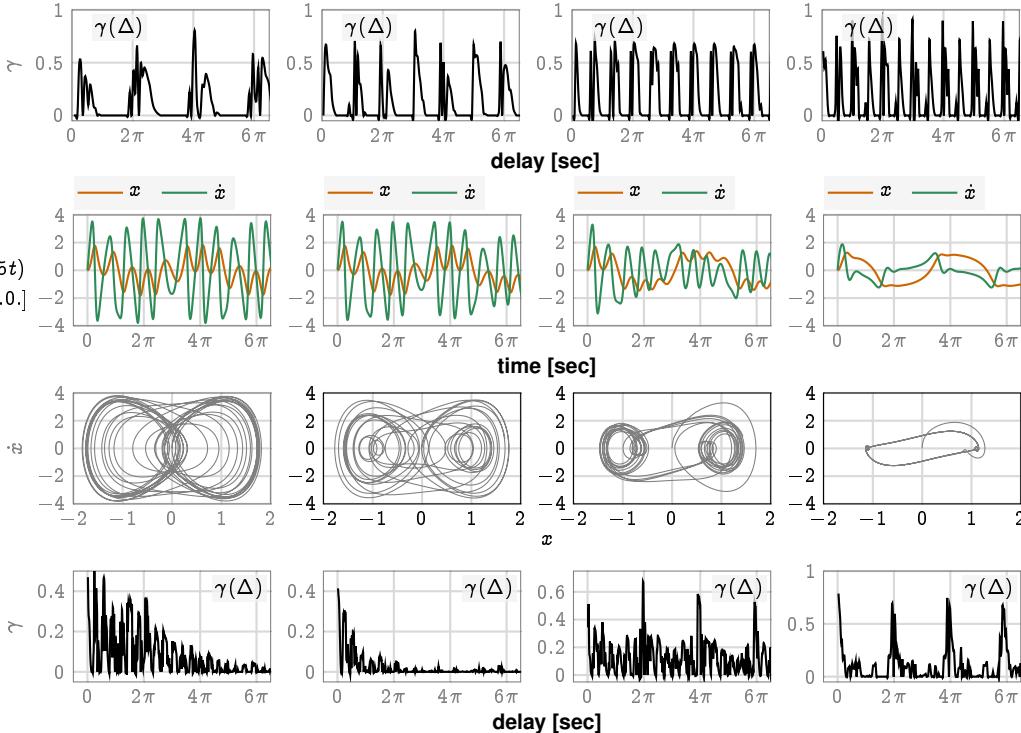


Periodic structure in $\gamma(\Delta)$ shows up in linear systems

b. Duffing Oscillator

$$\ddot{x} + \delta\dot{x} + x + 5x^3 = 8 \cos(0.5t)$$

$$\delta = [0.003 \quad 0.03 \quad 0.3 \quad 3.0.]$$



Periodic structure or Decay in $\gamma(\Delta)$ shows up in non-linear & chaotic systems

C. Real-world & Simulated Complex Systems

Periodic structure or Decay in $\gamma(\Delta)$ shows up in simulated complex systems only

