ME 360: FUNDAMENTALS OF SIGNAL PROCESSING, INSTRUMENTATION, AND CONTROL

Experiment No. 5
System Identification with Frequency Response Techniques using the Dynamic Signal Analyzer
Data Sheet

5.1 FREQUENCY RESPONSE

Method	Data				
Manual Sine Sweep	f [Hz]	$V_{p\text{-}p,out}$	G(f)	τ_{delay}	ϕ(f)
	$K_{mansweep}$				
	$\tau_{mansweep,\ -3\ dB}$				
	$\tau_{mansweep,\ 45^o}$				

Observations:

5.2 FREQUENCY RESPONSE OF MOTOR-GENERATOR SYSTEM

Sine-swept Method

Calculation of K and τ from Single-point Analysis of Bode Plots:

Attach Bode Plots for Sine-swept Method.

method	DSA Gain K_{DSA}	DSA Pole p_{DSA}	Steady-state Gain K	time constant τ [s] = $\frac{1}{2\pi f_b}$
DSA fit				

White-noise Method

Calculation of K and τ from Single-point Analysis of Bode Plots:

Attach Bode Plots for White-noise Method.

method	DSA Gain K_{DSA}	DSA Pole p_{DSA}	Steady-state Gain K	time constant τ [s] = $\frac{1}{2\pi f_b}$
DSA fit				

5.3 FREQUENCY RESPONSE OF BEAM-MASS SYSTEM

Results for Sine-swept Method for Beam System			
Parameter	measured	calculated	units
Primary Natural Frequency f_{nb}		21.5	Hz
Gain at Primary Natural Frequency $G(f_{nb})$			dB
Secondary Natural Frequency f_{nc}			Hz
Gain at Secondary Natural Frequency $G(f_{nc})$			dB

What is the source of the primary and secondary peaks in frequency response of the beam-mass system?