Determination of Stiffness of the Model Frame

Related Theory;

What is Structural Engineering?

What is Structural Analysis? Describe its types.

What is Structural Design?

What is Earthquake Resistant Building and how is the design carried out?

What are the three dynamic response types?

What is equation of motion? Study its derivation.

Observations & Calculations:

No.	Loads			Deflection		Stiffness (Load/Deflection)	Average Stiffness
	Observed	Corrected					
	(lbs)	(lbs)	(N)	(cm)	(mm)	(N/mm)	(N/mm)
	0.5	0.5	2.25	3.5	35	0.063	
1							
2							
3							
4							

Comments:

Determination of the Natural Frequency and Natural Time Period of the Free Vibration of Model Frame

Related Theory:

What is Frequency?

What is Natural Frequency?

What is Angular Frequency?

What is Cyclic Frequency?

What is Natural Time Period?

Observations & Calculations:

Stiff-ness	Mass	Time	No. of Rotations			Observed		Calculated		%age Difference	
(N/m)	(kg)	(sec)	In 10 sec	In 1 sec	f	$\omega = 2\pi f$	$T = 1/f$	$\omega = \sqrt{k/m}$	$T = 2\pi/\omega$	ω	T
89	0.5	10	17	1.7	1.7	10.68	0.588	13.35	0.471	20	19.9
			17	1.7							
			17	1.7							

Stiff-ness	Mass	Time	No. of Rotations			Observed		Calculated		%age Difference	
(N/m)	(kg)	(sec)	In 10 sec	In 1 sec	f	$\omega = 2\pi f$	$T = {}^{1}/_{f}$	$\omega = \sqrt{{}^{k}/_{m}}$	$T = 2\pi / \omega$	ω	T

Comments:

Determination Of Damping Ratio And Damping Coefficient Of Model Frame

Related Theory;

What is Frequency?

What is Damping?

What is Damped Oscillator?

What is Damped Natural Frequency?

What is Damping Coefficient?

What is Damping Ratio?

What is Damped System?

Observations & Calculations:

Stiffness	Mass	No. of Cycles	u_1	u_{1+j}		$\zeta = \frac{1}{2\pi j}\ln\frac{u_1}{u_{1+j}}$ (Damping Ratio)	$c_c = 2\sqrt{mk}$ (Damping Coefficient)	$c = \zeta c_c$ (Critical Damping Coefficient)	$\omega_d = \omega_o\sqrt{1-\zeta^2}$ (Damped natural frequency)
					Avg.				
(N/m)	(kg)		(cm)	(cm)	(cm)				(rad/sec)
89	1.0	15	20	11.5	11.5	0.0058	18.86	0.109	9.37
				11.5					
				11.5					

Stiffness	Mass	No. of Cycles	u_1	u_{1+j}		$\zeta = \frac{1}{2\pi j}\ln\frac{u_1}{u_{1+j}}$	$c_c = 2\sqrt{mk}$	$c = \zeta c_c$	$\omega_d = \omega_o\sqrt{1-\zeta^2}$
					Avg.				
(N/m)	(kg)		(cm)	(cm)	(cm)				(rad/sec)

Comments: