Falling load details

node at which falling mass impacts..... $N_{imp} := 4$

falling mass..... $M_{fall} := 10000kg$

height of drop..... $drop := 15mm$

estimate duration of impulse..... $t_{imp} := 20ms$

static load..... $P_s := M_{fall} g = 98.07\,kN$

velocity at impact..... $vel_{imp} := \sqrt{2g\,drop} = 0.54\frac{m}{s}$

the impulse is..... $I_o := M_{fall}\, vel_{imp} = 5.42\,kN\,s$

and the force generated for duration t_{imp} is..... $P_o := I_o \div t_{imp} = 271.2\,kN$ $\frac{P_o}{P_s} = 2.77$

engine room 1

Frequency calculations,

solve for the eigenvalues and vectors: $\phi := genvecs(K, M)$ $fq := \frac{\sqrt{genvals(K, M)}}{2\pi}$ $k := 1 .. length(fq)$

sort frequencies and eigenvectors into ascending order,

$freq := Re(fq)$ $freq_k := if\left(freq_k = 0, \frac{1000}{s}, freq_k\right)$

these extra statements needed to remove complex values from 'fq'... see below right

$order_k := match(sort(freq)_k, freq)_1$ $Freq_k := freq_{order_k}$ $eig^{\langle k \rangle} := \phi^{\langle order_k \rangle}$ $\psi := \sqrt{genvals(K, M)}$

$period := Freq^{-1}$ $\omega_k := \psi_{(order_k)}$

$mode := 2$

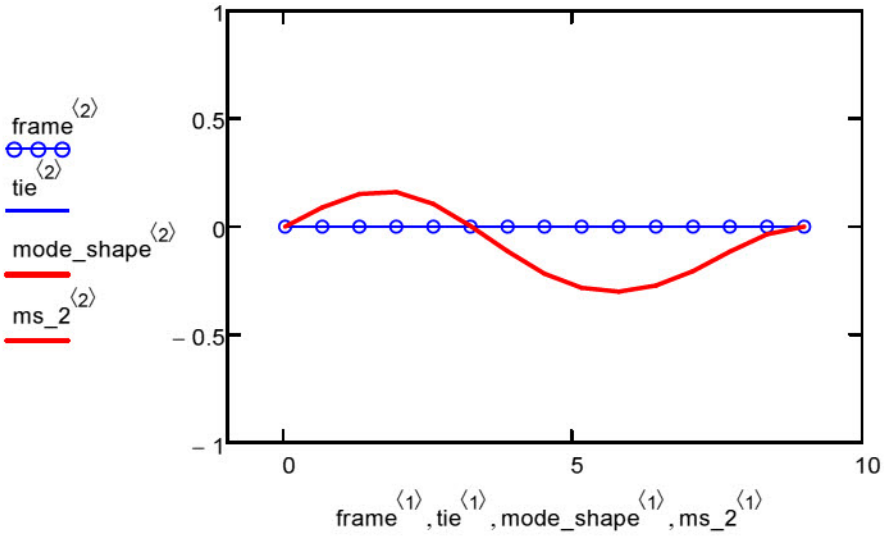
(change the multiplier, if necessary, to change scale in the plot below) $mult \equiv 3$

plot

$mode\_shape := d\_Line(1, No\_mem)$ $frame := Line(1, No\_mem)$

$Freq_{mode} = 18.87\,Hz$

$period_{mode} = 0.05\,s$



$fq =$

	1
1	70498.47
2	589.51
3	628.61
4	631.85
5	657.19
6	501.6
7	489.63
8	481.08
9	345.97
10	26.61
11	62.16
12	109.47
13	308.87
14	274.01
15	207.63
16	$2.13i \cdot 10^{153}$
17	$2.13 \cdot 10^{153}$
18	$2.13i \cdot 10^{153}$
19	$2.13 \cdot 10^{153}$
20	$2.13i \cdot 10^{153}$
21	$2.13 \cdot 10^{153}$
22	$2.13i \cdot 10^{153}$
23	$2.13 \cdot 10^{153}$
24	$2.13i \cdot 10^{153}$
25	$2.13 \cdot 10^{153}$
26	$2.13i \cdot 10^{153}$
27	$2.13 \cdot 10^{153}$
28	$2.13i \cdot 10^{153}$
29	...

$\frac{1}{s}$

$freq =$

	1
1	70498.47
2	589.51
3	628.61
4	631.85
5	657.19
6	501.6
7	489.63
8	481.08
9	345.97
10	26.61
11	62.16
12	109.47
13	308.87
14	274.01
15	207.63
16	1000
17	$2.13 \cdot 10^{153}$
18	1000
19	$2.13 \cdot 10^{153}$
20	1000
21	$2.13 \cdot 10^{153}$
22	1000
23	$2.13 \cdot 10^{153}$
24	1000
25	$2.13 \cdot 10^{153}$
26	1000
27	$2.13 \cdot 10^{153}$
28	1000
29	...

$\frac{1}{s}$

$Freq =$

	1
1	6
2	18.87
3	26.61
4	40.78
5	62.16
6	103.84
7	109.47
8	155.11
9	206.68
10	207.63
11	274.01
12	278.31
13	308.87
14	345.97
15	379.15
16	467.01
17	481.08
18	489.63
19	501.6
20	589.51
21	606.35
22	628.61
23	631.85
24	657.19
25	681.84
26	744.21
27	793.4
28	1000
29	...

$\frac{1}{s}$

bill_wadsworth@sky.com