VIB: Tuned Vibration Absorbers

Number of participants: 23

1. A tuned mass damper is

17 correct answers
out of 18 respondents

	A viscoelastic damping layer added to a system	0%	0 votes
	A hydraulic damper used to dissipate energy in a system	6%	1 vote
✓	An auxiliary dynamic system designed to absorb the energy in a narrow frequency band around the natural frequency of the primary system	94%	17 votes

2. Tuning of a TMD consists in

17 correct answers
out of 21 respondents

✓	Finding the optimal values of its parameter to minimize the frequency response function of the primary system	81%	17 votes
	Finding the optimal values of its parameters to minimize the frequency response function of the TMD	14%	3 votes
	All of the above	5%	1 vote

3. Adding an undamped TMD to a structure introduces an anti-resonance

0 correct answer
out of 17 respondents

✓	At the natural frequency of the TMD	29%	5 votes
	At the natural frequency of the structure	47%	8 votes
✓	At the natural frequency of both if these frequencies are equal	41%	7 votes

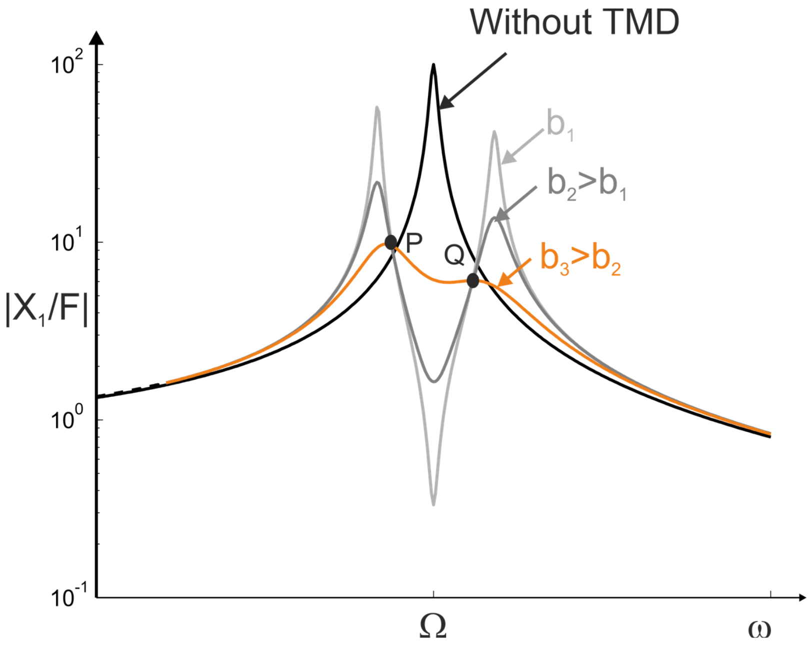
4. In order to tune the frequency of a pendulum TMD, one needs to change

12 correct answers
out of 19 respondents

	its mass	11%	2 votes
✓	its length	63%	12 votes
	all of the above	26%	5 votes

5. The figure represents the FRF of a structure to which a damped TMD is attached, where the natural frequency of the TMD is exactly tuned to the natural frequency of the structure. Is this an optimal tuning ? Why ?

0 correct answer
out of 11 respondents



TMD high damping makes the system more like a 1DOF system

No, P and Q are at different levels

One's can delay the natural frequency of the tmd to get the same damping on each resonance frequency of the structure created

No, the optimal where P and Q have the same amplitude

Yes, is optimal. A little less than the nt. Freq. Of the system

Not the orange, too much damping

Its not an optimal solution as it will less reduce the amplitude

Is not optimal, because p and q isn't in the same level

No, P and Q should be at the same height.

No, for the best solution P and Q should be equal

No, P and Q should have the same height

Correct answer

It is not an optimal tuning, it can be improved by taking P and Q at the same height

6. In order to design a TMD and find its optimal parameters, the procedure to follow is (put in the right order)

19 respondents

Most frequent combinations:

7 👤 ✗

- 2 Reduce the system to a SDOF system using single mode approximation (Keq, Meq). ✗
- 1 Choose a natural frequency of the system to be damped ✓
- 4 Define the mass of the TMD (do not exceed a few % of the total mass of the main structure) ✗
- 3 Determine the stiffness of the TMD using Den Hartog's rule nu=1/(1+mu) ✓
- 5 Determine the damping coefficient of the TMD using Den Hartog's rule xi=sqrt(3mu/(8(1+mu))) ✗

5 👤 ✗

- 1 Choose a natural frequency of the system to be damped ✗
- 2 Reduce the system to a SDOF system using single mode approximation (Keq, Meq). ✗
- 4 Define the mass of the TMD (do not exceed a few % of the total mass of the main structure) ✗
- 3 Determine the stiffness of the TMD using Den Hartog's rule nu=1/(1+mu) ✓
- 5 Determine the damping coefficient of the TMD using Den Hartog's rule xi=sqrt(3mu/(8(1+mu))) ✗

2 👤 ✗

- 2 Reduce the system to a SDOF system using single mode approximation (Keq, Meq). ✗
- 4 Define the mass of the TMD (do not exceed a few % of the total mass of the main structure) ✗
- 1 Choose a natural frequency of the system to be damped ✗
- 3 Determine the stiffness of the TMD using Den Hartog's rule nu=1/(1+mu) ✓
- 5 Determine the damping coefficient of the TMD using Den Hartog's rule xi=sqrt(3mu/(8(1+mu))) ✗

Correct answer

4	Define the mass of the TMD (do not exceed a few % of the total mass of the main structure)	0 👤✓
1	Choose a natural frequency of the system to be damped	7 👤✓
5	Determine the damping coefficient of the TMD using Den Hartog's rule xi=sqrt(3mu/(8(1+mu)))	0 👤✓
3	Determine the stiffness of the TMD using Den Hartog's rule nu=1/(1+mu)	14 👤✓
2	Reduce the system to a SDOF system using single mode approximation (Keq, Meq).	2 👤✓

7. When tuning a TMD to a specific mode of a structure, the mass ratio to taken into account in Den Hartog is

9 correct answers
out of 15 respondents

	the ratio between the mass of the TMD and the total mass of the structure	20%	3 votes
✓	the ratio between the mass of the TMD and the equivalent mass computed for the mode to which we tune the device and at the point of attachment (taking into account also the direction of motion)	60%	9 votes
	the ratio between the mass of the TMD and the modal mass of the mode to which we tune the device	20%	3 votes