

VIB : Dynamic response computation

Number of participants: 18



In order to compute the dynamic response of a structure, one needs to (put in the right order)

8 respondents

Most frequent combinations:

2

- 5** Identify geometry, material properties, boundary conditions and excitations
- 1** Make a model of the structure
- 4** Obtain the mass and stiffness matrices (and damping if available)
- 8** Compute the eigenfrequencies and mode shapes
- 2** Perform a truncation (keep only the important mode shapes)
- 7** Project the equations of motion in the modal domain
- 3** Solve the equations of motion for each mode separately

1

- 1** Make a model of the structure
- 5** Identify geometry, material properties, boundary conditions and excitations
- 4** Obtain the mass and stiffness matrices (and damping if available)
- 3** Solve the equations of motion for each mode separately (time or frequency domain)
- 8** Compute the eigenfrequencies and mode shapes
- 2** Perform a truncation (keep only the important mode shapes)

1

- 5** Identify geometry, material properties, boundary conditions and excitations
- 4** Obtain the mass and stiffness matrices (and damping if available)
- 1** Make a model of the structure
- 8** Compute the eigenfrequencies and mode shapes
- 2** Perform a truncation (keep only the important mode shapes)
- 7** Project the equations of motion in the modal domain
- 6** Determine the response at specific dofs based

(time or frequency domain)	Project the equations of motion in the modal domain ✗	on the modal responses
6 Determine the response at specific dofs based on the modal responses ✓	7	3 Solve the equations of motion for each mode separately (time or frequency domain) ✗
	6 Determine the response at specific dofs based on the modal responses ✓	

Correct answer

5	Identify geometry, material properties, boundary conditions and excitations	6
1	Make a model of the structure	5
4	Obtain the mass and stiffness matrices (and damping if available)	6
8	Compute the eigenfrequencies and mode shapes	4
7	Project the equations of motion in the modal domain	2
2	Perform a truncation (keep only the important mode shapes)	3
3	Solve the equations of motion for each mode separately (time or frequency domain)	3
6	Determine the response at specific dofs based on the modal responses	5



2. The modal response in the frequency domain is computed

6 correct answers
out of 13 respondents

using a convolution between the impulse response and the modal force



7 votes

analytically as a function of the modal properties (mass, stiffness, damping) and the modal force



6 votes

using a numerical integration scheme



0 votes



3. The modal response in the time domain is computed

0 correct answer
out of 11 respondents

using a convolution between the impulse response and the modal force



11 votes

analytically as a function of the modal properties (mass, stiffness, damping) and the modal force



0 votes

using a numerical integration scheme



0 votes



4. What are the ways to introduce damping in the model ?

0 correct answer
out of 9 respondents

self excitation

Rayleigh damping, loss factor, modal damping

Rayleigh damping, loss factor, Hystertic

Raleigh damping , hysteric damping (loss factor), modal damping

With external dampers

Viscous damping

Empirically

Loss factor

Rayleigh

Correct answer

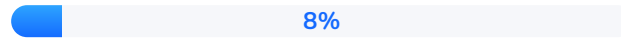
based on loss factors at the material level



5. **For a MDOF system, with damping modelled using a loss factor, after a certain time, the impulse response is dominated by**

10 correct answers
out of 12 respondents

the last mode



1 vote

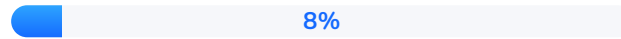


the first mode



10 votes

a combination of all the modes



1 vote



6. **For base excitation problems (such as earthquakes), the modal force is given by**

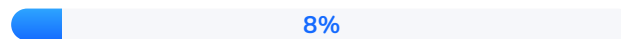
7 correct answers
out of 12 respondents

the total mass of the structure multiplied by the ground acceleration



4 votes

the mass of the base of the structure multiplied by the ground acceleration



1 vote



the modal acceleration factor which is a function of the mass matrix and the mode shape considered multiplied with the ground acceleration



7 votes