

# DOS : Dynamic response computation

Number of participants: 14

1.  
2.  
3.

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

11 respondents

## Most frequent combinations:

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

structure	the important mode shapes)	the important mode shapes)
Identify geometry, material properties, boundary conditions and excitations 8 <span style="color: red;">✗</span>	Determine the response at specific dofs based on the modal responses 1 <span style="color: green;">✓</span>	Determine the response at specific dofs based on the modal responses 1 <span style="color: green;">✓</span>

### Correct answer

8	Identify geometry, material properties, boundary conditions and excitations	5
7	Make a model of the structure	5
3	Obtain the mass and stiffness matrices (and damping if available)	10
6	Compute the eigenfrequencies and mode shapes	4
4	Project the equations of motion in the modal domain	2
5	Perform a truncation (keep only the important mode shapes)	0
2	Solve the equations of motion for each mode separately (time or frequency domain)	1
1	Determine the response at specific dofs based on the modal responses	4



## 2. The modal response in the frequency domain is computed

3 correct answers  
out of 11 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



3 votes

using a numerical integration scheme



1 vote



## 3. The modal response in the time domain can be 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 ?

3 respondents

We can introduce it in different ways : Based on the mass and stiffness (to decouple the equation) Rayleigh

Rayleigh

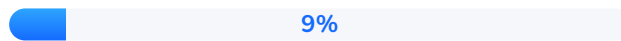
C matrix



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

**8 correct answers**  
out of 11 respondents

the last mode



1 vote



the first mode



8 votes

a combination of all the modes



2 votes



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

9 correct answers  
out of 10 respondents

the total mass of the structure multiplied by the ground acceleration



1 vote

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



0 votes

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



9 votes