VIB : Dynamic response computation

Number of participants: 17

In order to compute the dynamic

1. response of a structure, one needs to (put in the right order)

11 respondents

Most frequent combinations:



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

 \checkmark

2. The modal response in the frequency domain is computed

1 correct answer

out of 12 respondents

using a convolution between the impulse response and the modal force	83%	10 votes
analytically as a function of the modal properties (mass, stiffness, damping) and the modal force	8%	1 vote
using a numerical integration scheme	8%	1 vote

3. The modal response in the time domain is computed **0** correct answer out of 12 respondents using a convolution between the impulse response 12 votes \checkmark 100% and the modal force analytically as a function of the modal properties 0% 0 votes (mass, stiffness, damping) and the modal force using a numerical **** 0 votes 0% integration scheme

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

10 respondents

Löss factor

Loss factor

Modal damping

Rayleigh

Rayleigh damping, modal damping

Loss factor

Modal damping

Loss factor

Global damping

Rayleigh model

 \checkmark

For a MDOF system, with damping modelled using a loss factor, after a certain time, the impulse response is dominated by 7 correct answers out of 14 respondents

the last mode	29%	4 votes
the first mode	50%	7 votes
a combination of all the modes	21%	3 votes

 \checkmark

For base excitation problems (such as 6. earthquakes), the modal force is given by		9 correct answers out of 12 respondents
the total mass of the structure multiplied by the ground acceleration	25%	3 votes
the mass of the base of the structure multiplied by the ground acceleration	0%	0 votes
the modal acceleration factor which is a function of the mass matrix and the mode shape considered multiplied with the ground acceleration	75%	9 votes