VIB : Dynamic response computation

Number of participants: 36

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

28 respondents

Most frequent combinations:

2	
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) ✓
8	Compute the eigenfrequencies and mode shapes ✓
7	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) ✓
6	Determine the response at specific dofs based on the modal responses ✓

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6	Determine the response at specific dofs based on the modal responses ✓

Correct answer

5	Identify geometry, material properties, boundary conditions and excitations	16
1	Make a model of the structure	14
4	Obtain the mass and stiffness matrices (and damping if available)	17
8	Compute the eigenfrequencies and mode shapes	11
7	Project the equations of motion in the modal domain	8

2	Perform a truncation (keep only the important mode shapes)	6
3	Solve the equations of motion for each mode separately (time or frequency domain)	9
6	Determine the response at specific dofs based on the modal responses	16

2. The modal response in the frequency domain is computed

19 correct answers
out of 29 respondents

	using a convolution between the impulse response and the modal force	34%	10 votes
✓	analytically as a function of the modal properties (mass, stiffness, damping) and the modal force	66%	19 votes
	using a numerical integration scheme	0%	0 votes

3. The modal response in the time domain is computed

1 correct answer
out of 27 respondents

✓	using a convolution between the impulse response and the modal force	89%	24 votes
	analytically as a function of the modal properties (mass, stiffness, damping) and the modal force	7%	2 votes
✓	using a numerical integration scheme	15%	4 votes

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

0 correct answer
out of 30 respondents

- modal damping
- Rayleigh damping
- Rayleigh
- Tuned damped mass
- Rayleigh damping, loss factor, modal damping
- Rayleigh damping
- Loss factor
- Rayleigh damping, Modal damping approach, loss factor
- Loss factor
- 3 ways, modal damping, ond 2 weird names
- Rayleigh, modal, loss factor
- 3 different types
- Loss factor
- Rayleigh, Loss factor and Modal Damping
- rayleigh damping
- modal damping
- Ryaleigh Damping, Loss factor, Experimental damping factor for each mode
- Loss factor

loss factor

Modal damping, rayleigh damping and loss factor

Constant damping Modal damoing Rayleigh damping

Viscous damping

1. Rayleigh 2. Modal 3. Loss factor

Rayleigh, etha/2, modal damping

Rayleigh, modal and loss factor

Loss factor, Rayleigh modal

Rayleigh, modal

Dampers

1-rayleigh 2-loss factor 3-modal damping

Raileygh damping

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

17 correct answers
out of 23 respondents

	the last mode	4%	1 vote
✓	the first mode	74%	17 votes
	a combination of all the modes	22%	5 votes

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

17 correct answers
out of 23 respondents

	the total mass of the structure multiplied by the ground acceleration	17%	4 votes
	the mass of the base of the structure multiplied by the ground acceleration	9%	2 votes
✓	the modal acceleration factor which is a function of the mass matrix and the mode shape considered multiplied with the ground acceleration	74%	17 votes