DOS 2021 : Dynamic response computation

Number of participants: 8

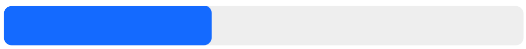
1

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

- ✓ Project the equations of motion in the modal domain
- ✓ Obtain the mass and stiffness matrices (and damping if available)
- ✓ Make a model of the structure
- ✓ Compute the eigenfrequencies and mode shapes
- ✓ Determine the response at specific dofs based on the modal responses
- ✓ Perform a truncation (keep only the important mode shapes)
- ✓ Solve the equations of motion for each mode separately (time or frequency domain)

2

The modal response in the frequency domain is computed

using a convolution between the impulse response and the modal force		40%	2 votes
✓ analytically as a function of the modal properties (mass, stiffness, damping) and the modal force		60%	3 votes
using a numerical integration scheme		0%	0 votes

3

The modal response in the time domain is computed

✓ using a convolution between the impulse response and the modal force		100%	6 votes
analytically as a function of the modal properties (mass, stiffness, damping) and the modal force		0%	0 votes
✓ using a numerical integration scheme		0%	0 votes

4

What are the ways to introduce damping in the model ?

Assume 1% as first guess

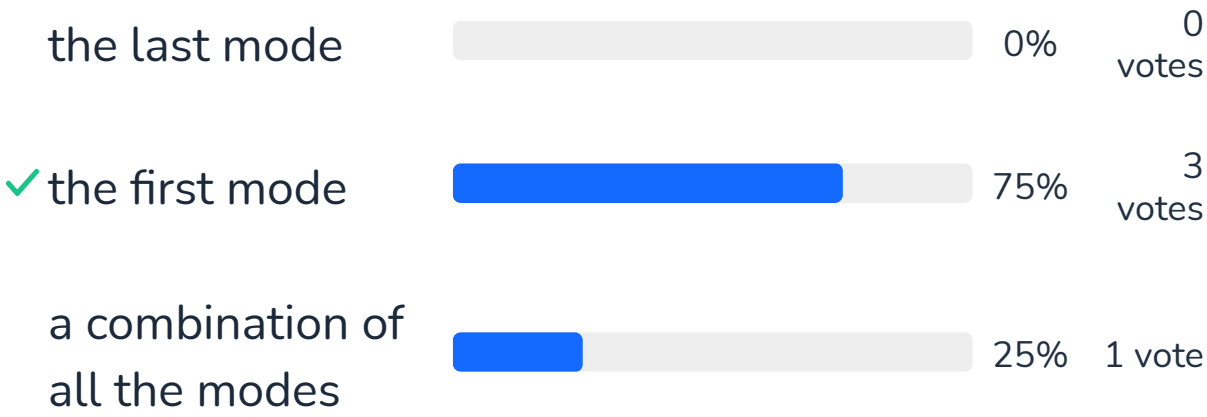
Starting by 1% if we don't have additional information

1%

Just take 1%

5

For a SDOF system, after a certain time, the impulse response is dominated by



6

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

the total mass of the structure multiplied by the ground acceleration		60%	3 votes
the mass of the base of the structure multiplied by the ground acceleration		20%	1 vote
✓ the modal acceleration factor which is a function of the mass matrix and the mode shape considered		20%	1 vote