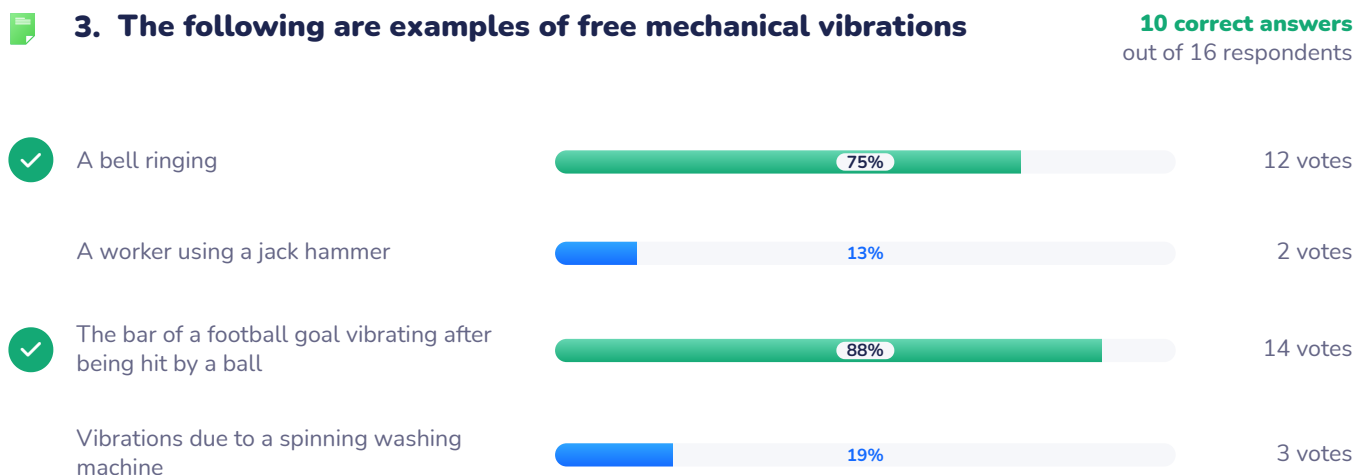
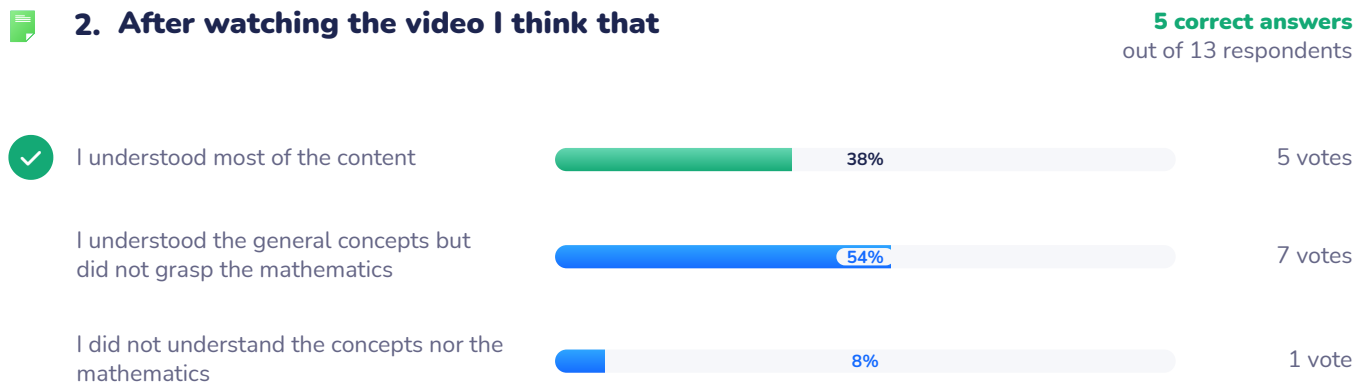
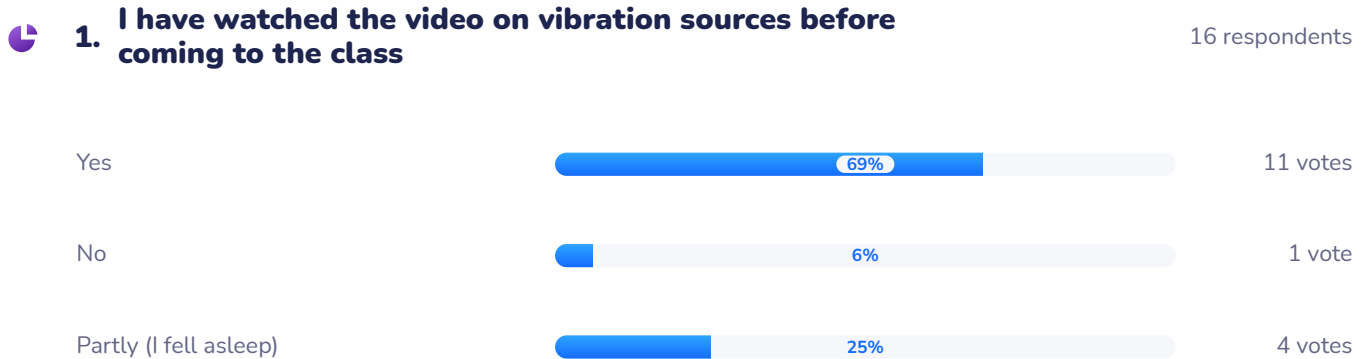


# DOS : Vibration sources and Fourier Analysis

Number of participants: 17



#### 4. Which of the following statements are true ? 10 correct answers out of 15 respondents

- A harmonic excitation is a special case of a periodic excitation 80% 12 votes
- A periodic excitation is a special case of a harmonic excitation 20% 3 votes
- The period of a random signal is much smaller than for an harmonic one 0% 0 votes
- A random force signal has an infinite period 87% 13 votes

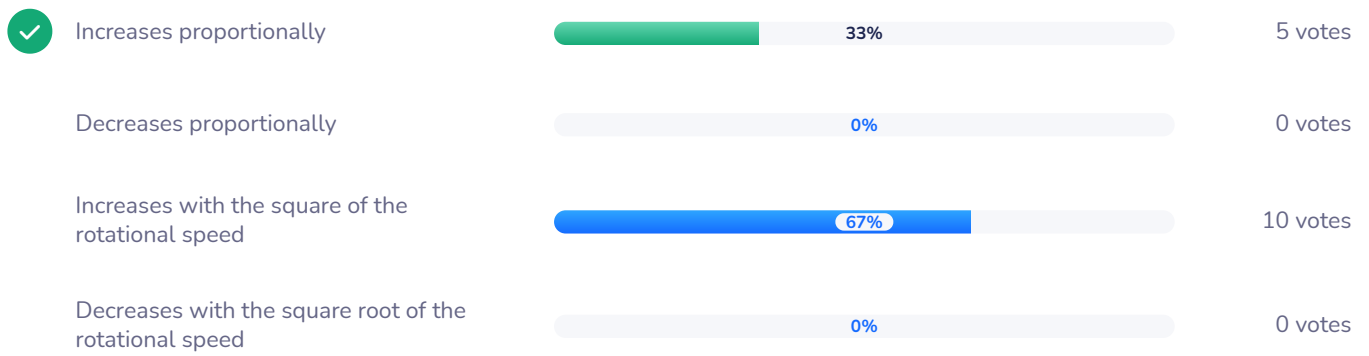
#### 5. A rigid rotating machine induces a force that is 4 correct answers out of 16 respondents

- periodic 50% 8 votes
- harmonic 75% 12 votes
- random 0% 0 votes

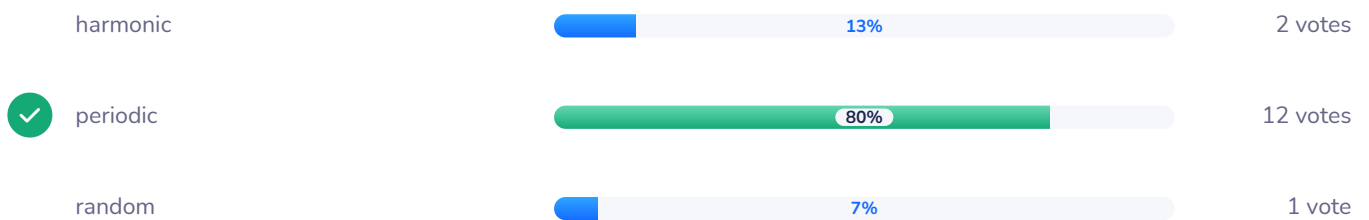
#### 6. Any rotating machine produces a 11 correct answers out of 13 respondents

- harmonic force 8% 1 vote
- periodic force 85% 11 votes
- random force 8% 1 vote

**7. When the rotational speed of a machine increases, the frequency of the forces produced** **5 correct answers**  
out of 15 respondents



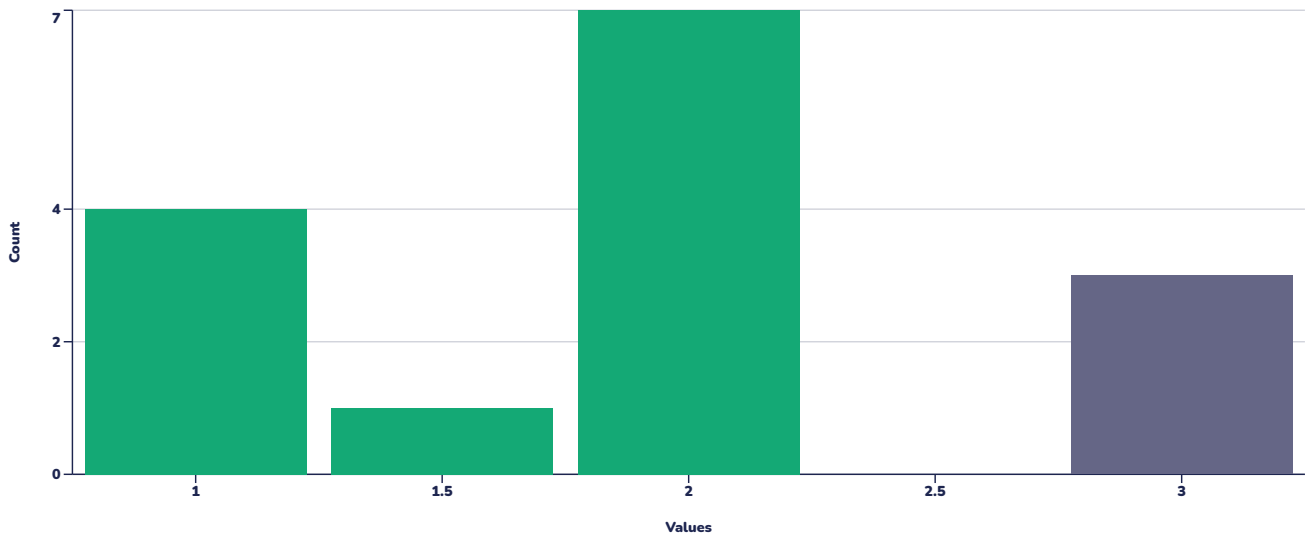
**8. The force applied by a pedestrian walking or running at constant speed on a bridge is** **12 correct answers**  
out of 15 respondents





### 9. The main frequency of excitation for walking pedestrians is around

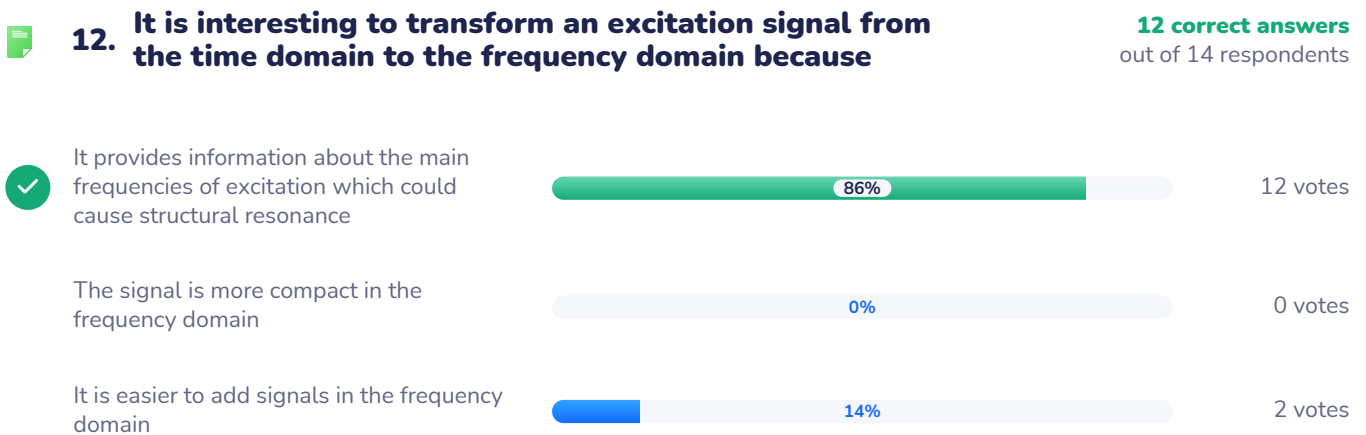
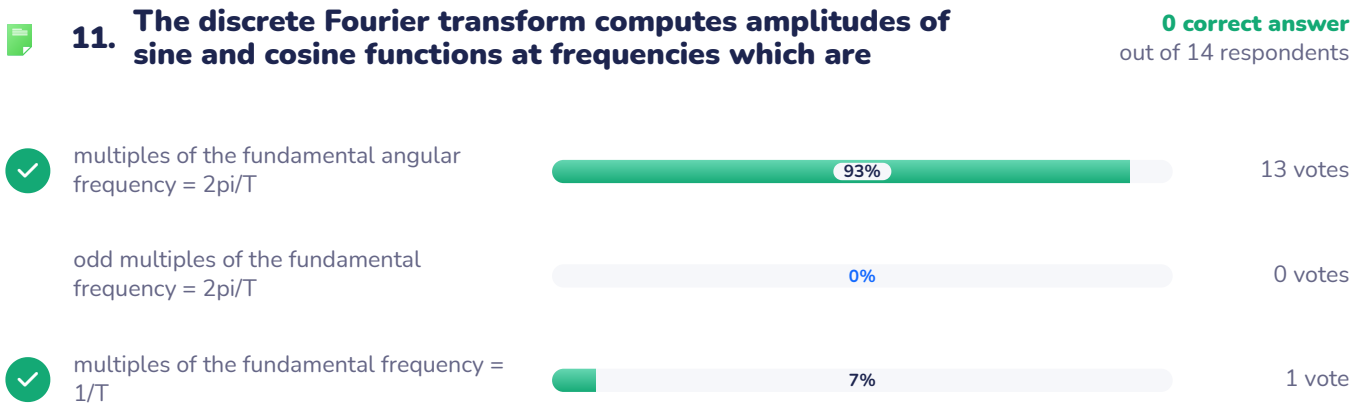
15 correct answers  
out of 15 respondents



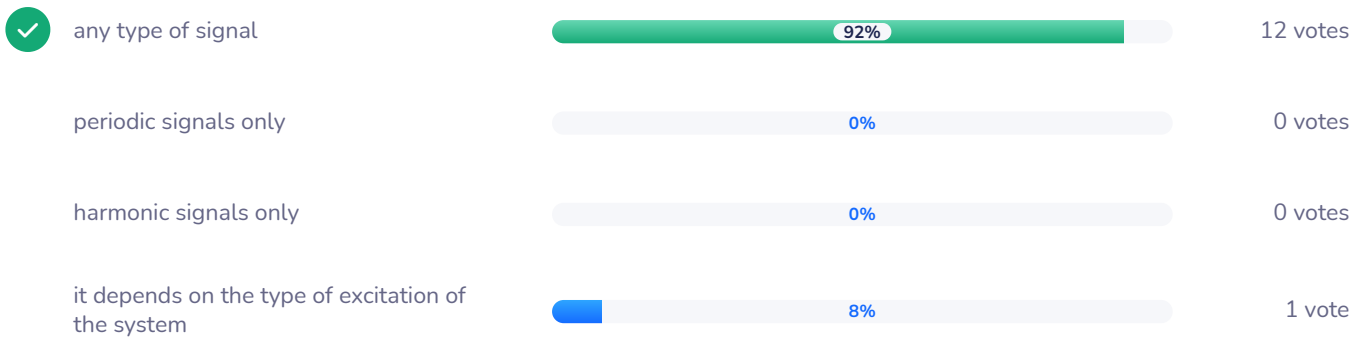
<b>1</b> Minimum	<b>1.94</b> Mean	<b>3</b> Maximum	<b>2</b> Median	<b>0.66</b> Standard deviation	<b>0.43</b> Variance
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**Correct answer**

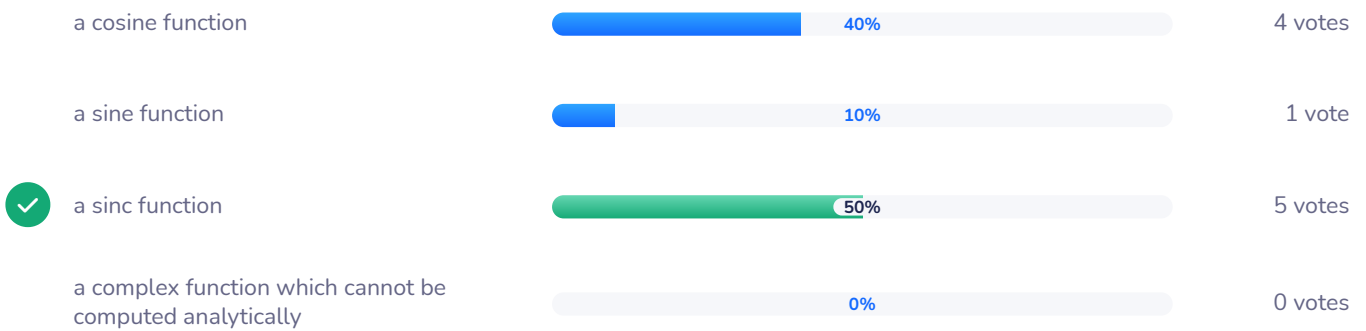
**Between 1 and 3**



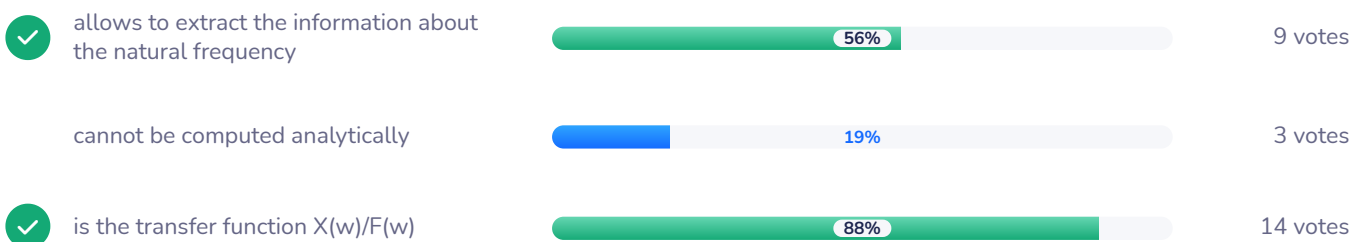
**13. The continuous Fourier transform applies to** **12 correct answers**  
out of 13 respondents



**14. The continuous Fourier transform of a rectangle (pulse) is** **5 correct answers**  
out of 10 respondents



**15. For a SDOF system (and MDOF), the Fourier transform of the impulse response  $h(t)$**  **6 correct answers**  
out of 16 respondents



**16. Convolution in the time domain corresponds to** **13 correct answers**  
out of 13 respondents

- multiplication in the frequency domain 100% 13 votes
- convolution in the frequency domain 0% 0 votes
- deconvolution in the frequency domain 0% 0 votes
- division in the frequency domain 0% 0 votes

**17. The continuous Fourier transform of a sampled signal is** **7 correct answers**  
out of 14 respondents

- Discrete and periodic 21% 3 votes
- Continuous and periodic 50% 7 votes
- Discrete with the same number of samples as the original signal 29% 4 votes


**18. Aliasing happens when** **0 correct answer**  
out of 0 respondent

- The sampling frequency is too high with respect to the frequency content of the signal 0% 0 votes
- The sampling frequency is too low with respect to the frequency content of the signal 0% 0 votes
- The sampling frequency is equal to the frequency content of the signal 0% 0 votes

**19. YouTube (camera shutter speed and frame rate match helicopter`s rotor)**

0 respondent

camera shutter speed and frame rate match helicopter`s rotor



**20. When using Fast Fourier Transform on sampled signals, you can increase the frequency resolution by**

**0 correct answer**  
out of 0 respondent

decreasing the time step of the sampling signal, keeping the total measurement time constant



0 votes

increasing the time step of the sampling signal, keeping the total measurement time constant



0 votes

increasing the measurement time, whatever the time step of the sampling signal



0 votes

**21. When using DFT, the time step of the sample signal has an influence on**

**0 correct answer**  
out of 0 respondent

The frequency resolution of the DFT



0 votes

The maximum frequency of the DFT



0 votes

It has no influence on the DFT



0 votes



**22. Suppose the sampling frequency of the accelerometer on your smartphone is 200 Hz. Up to what frequency can you measure acceleration signals ?**

10 correct answers  
out of 14 respondents

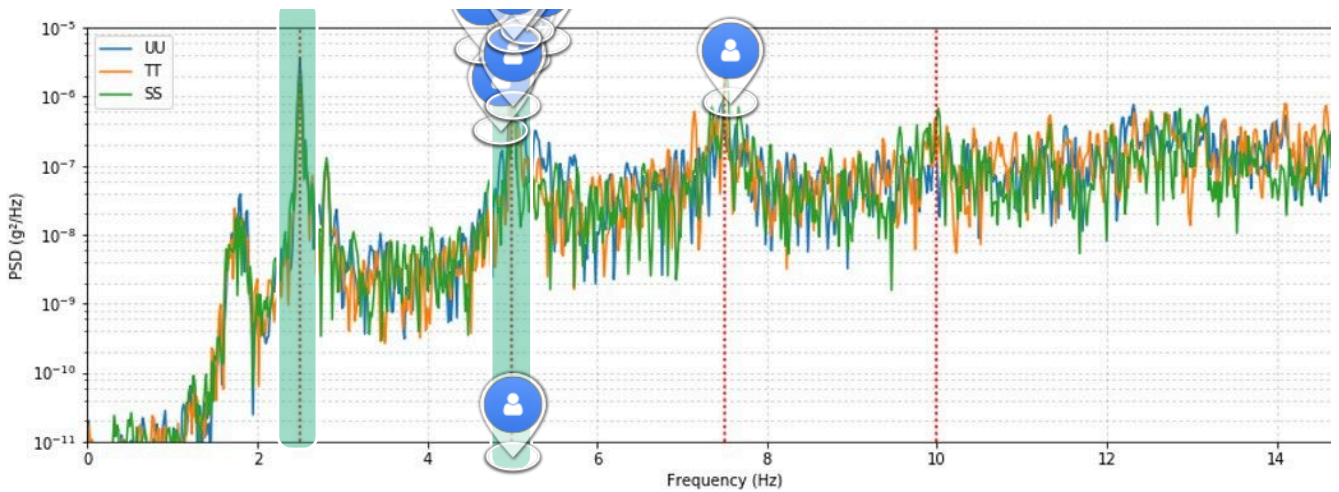
200 Hz 14% 2 votes

100 Hz 71% 10 votes

It depends on the length of the measurement 14% 2 votes

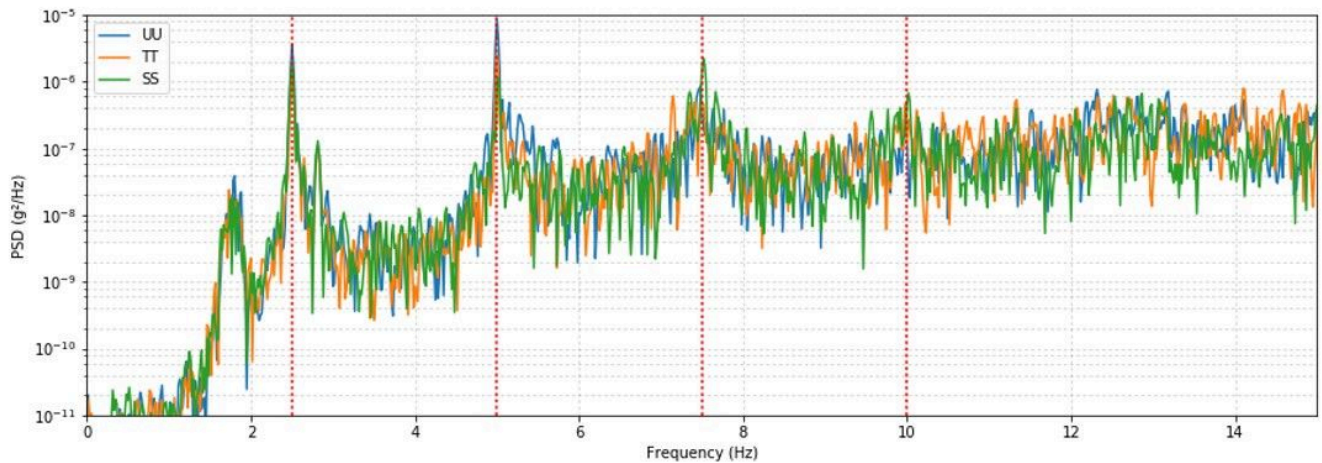
**23. Following acceleration measurements show a real world structure responding to a particular vibration. Can you identify the frequencies at which the highest accelerations are occurring ?**

14 respondents



## 24. Where do you think these frequencies are coming from?

14 respondents

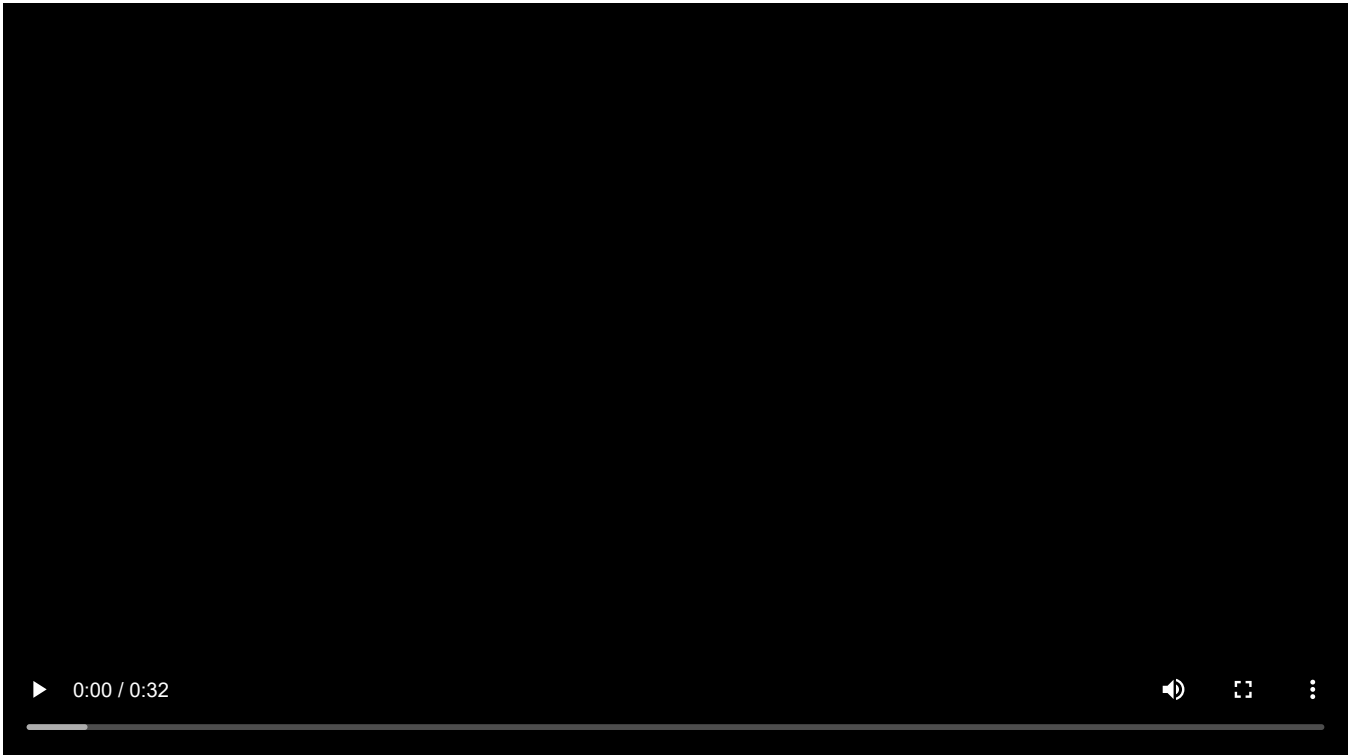


- n.wo
- Walking
- It's giroup
- vibrations due to same walk pace
- Resonating frequencies
- Harmonic
- Pedestrians
- Periodic excitation
- One signal with harmonic content
- Periodic signal
- Don't know
- Periodic
- From nature excitation

Harmonics

**25. VID\_20190503\_223348.mp4**

0 respondent

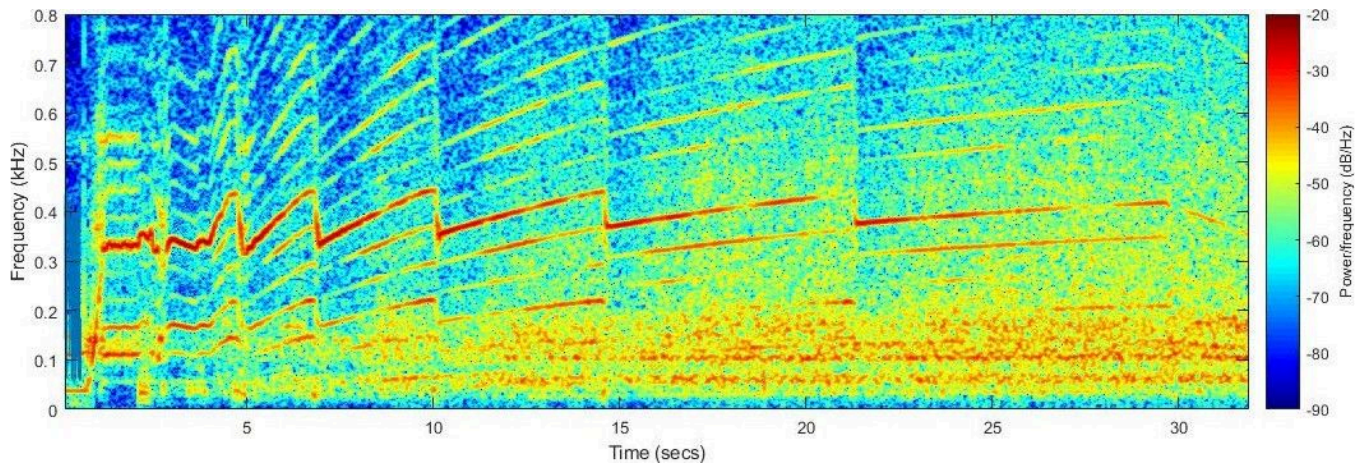


We see people dancing and jumping to music.



26. This time-frequency plot, or waterfall plot, shows how the Fourier spectrum of an excitation source can vary over time. Do you have an idea which machine this is from?

6 respondents



Car acceleration

Compaction test

Washing machine

shock absorber

Pump

It's giroup