



ALICE

ITS3 plenary

Tuesday 17<sup>th</sup> April 2023

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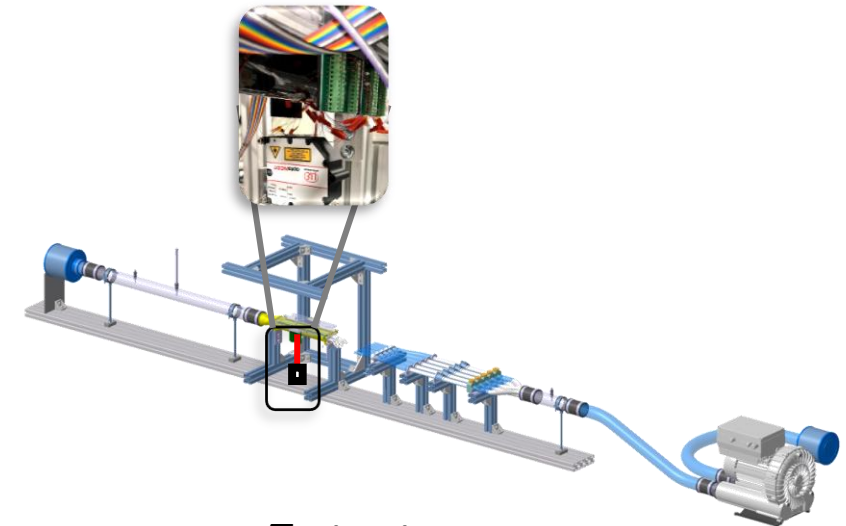
# **ITS3 VIBRATIONS: CONFOCAL SENSOR**

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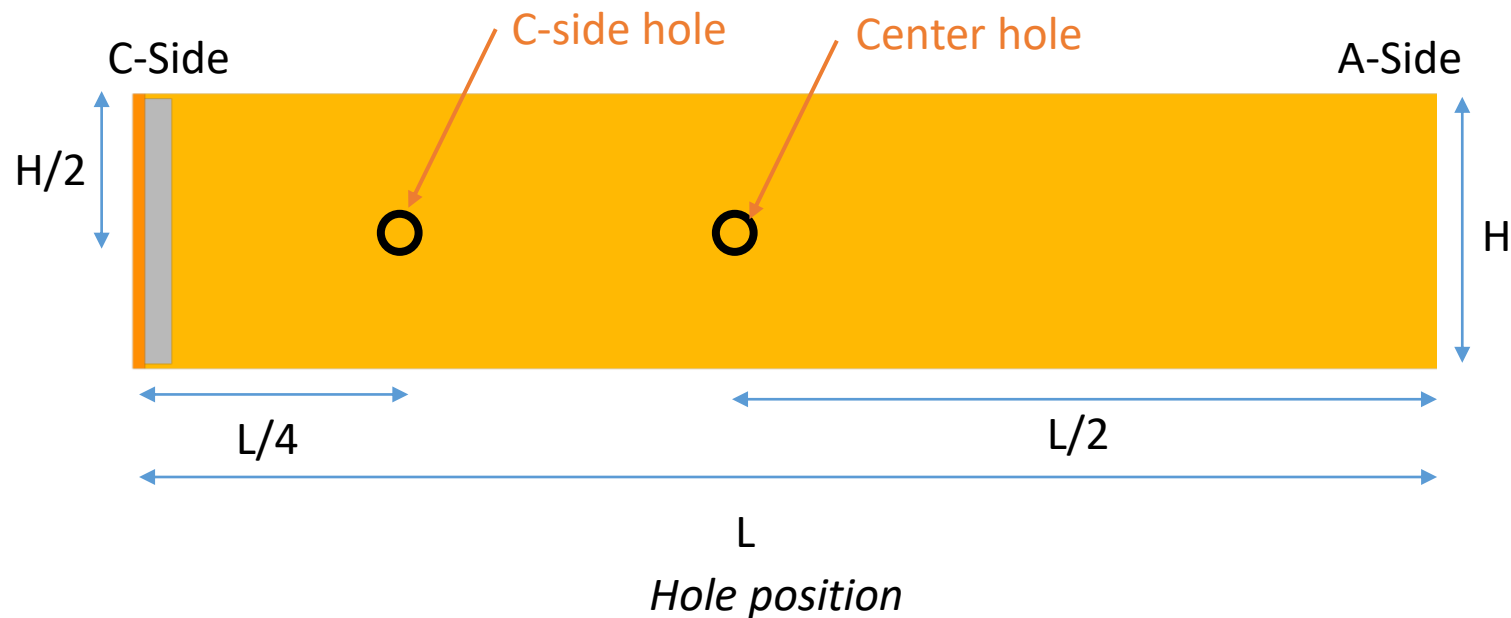
**Aitor Amatriain**



- Same test setup as before but replacing the laser displacement sensor by the laser confocal sensor of lower error
- L2 is measured
- Two holes of  $D = 12$  mm drilled in the CYSS
- Test performed at  $v_{\infty} \approx 8$  m/s



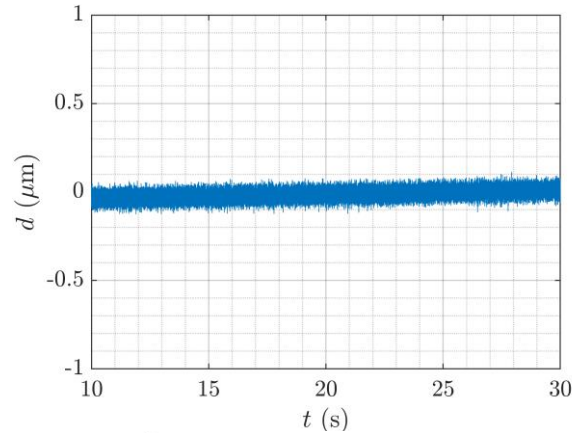
*Test setup*



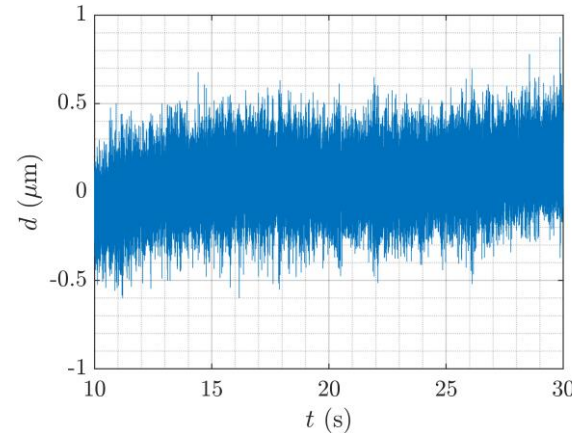
- Both holes closed, laser in the center hole. Time history and FFT obtained

TIME HISTORY

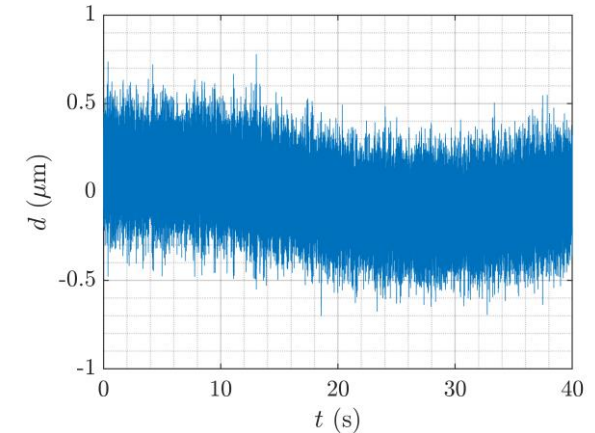
**NO AIR**



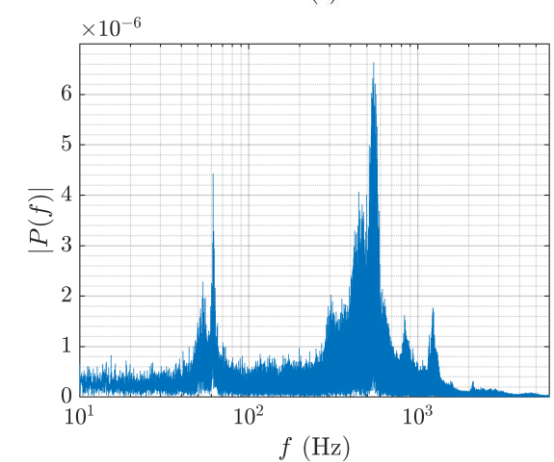
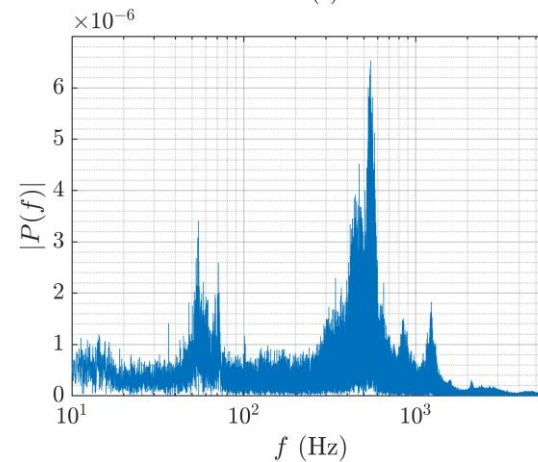
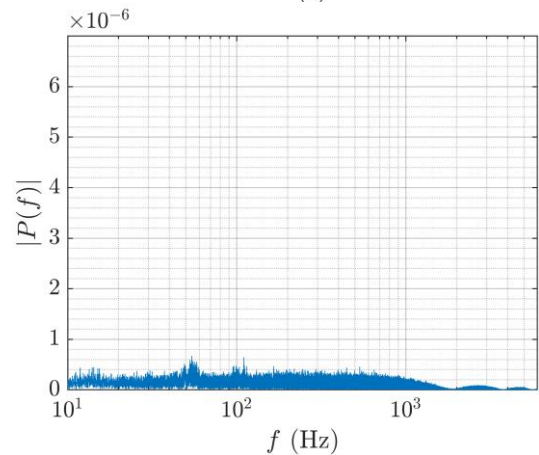
**AIR-TRANSIENT**



**AIR-STEADY**



FFT

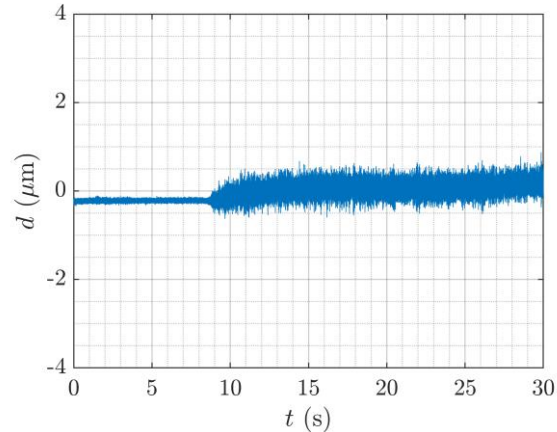


- Noise with no air  $\rightarrow d \pm 0.1 \mu\text{m}$
- Similar displacements and frequencies in the transient and steady state,  $d \pm 0.5 \mu\text{m}$
- First frequency of L2  $> 1000 \text{ Hz}$ , higher than the peaks
- Linearity (error) of the sensor  $\pm 0.5 \mu\text{m} \approx d!!$

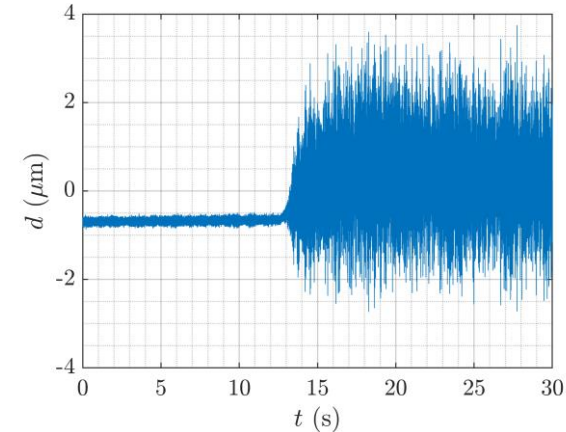
- Laser in the center hole, comparison between c-side hole closed/open

TIME  
HISTORY

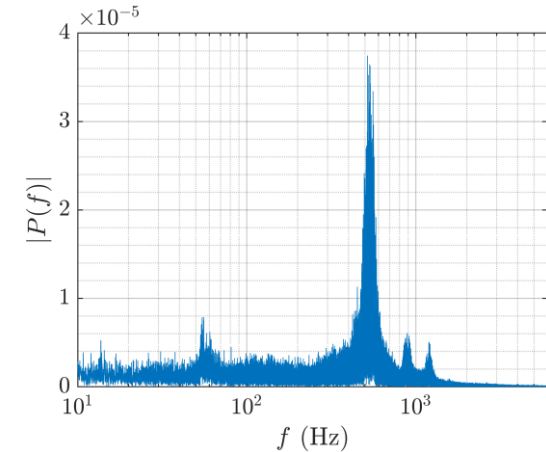
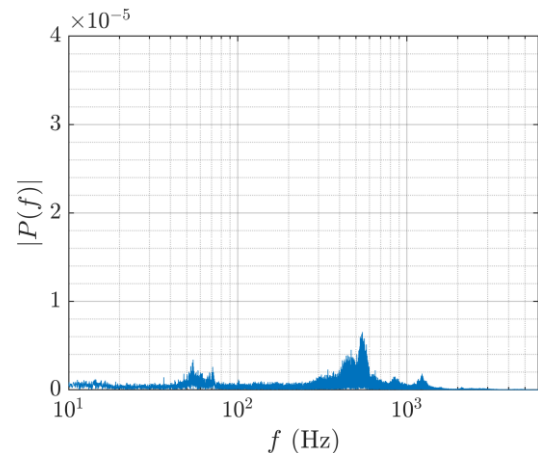
**C-side hole closed**



**C-side hole open**



FFT

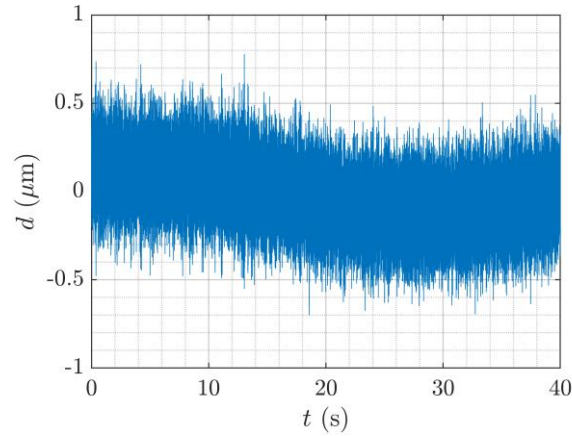


- Significant differences between the two cases
- Ambient  $p > p$  inside the prototype -> High velocities close to the hole -> higher vibrations
- Important aspect if the system is not completely isolated
- Similar frequencies

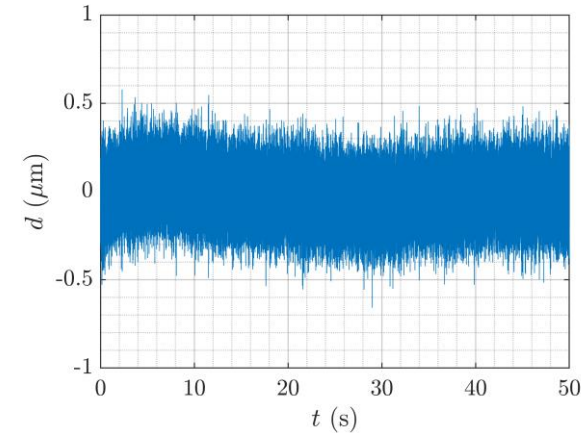
- Both holes closed. Comparison of vibrations in the C-side hole and the center hole

TIME  
HISTORY

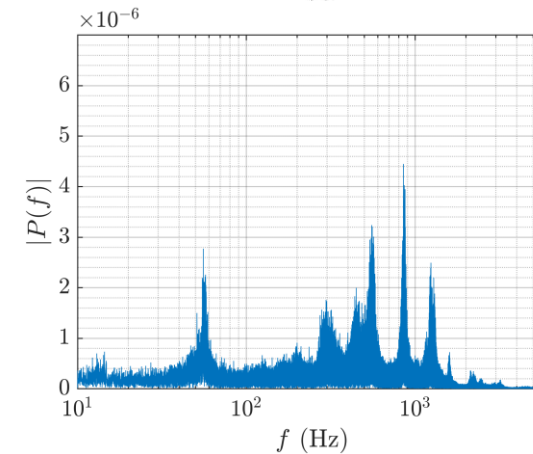
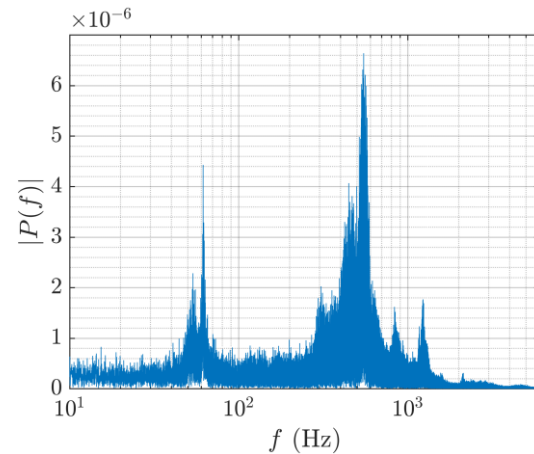
Center hole



C-side hole



FFT



- The C-Side hole is closer to the supports -> Lower displacements near the C Side
- Turbulent flow at high velocity near the foam (holes) -> More dominant frequencies in the vibrations
- Important to have two sensors in the same test to check if vibrations are generated by the fan