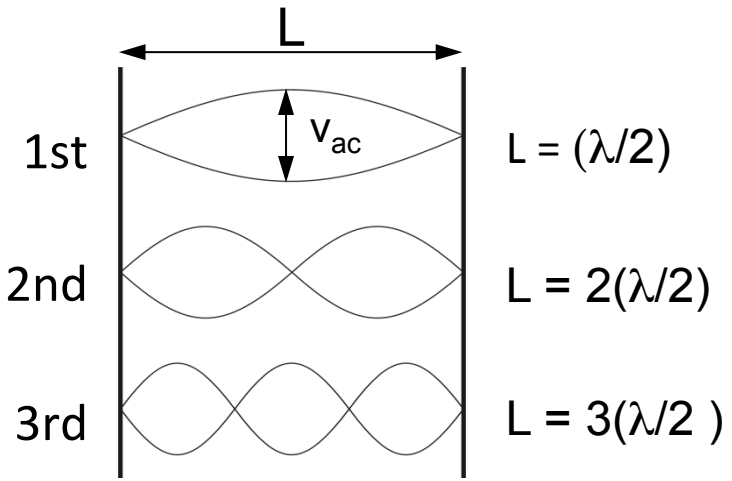
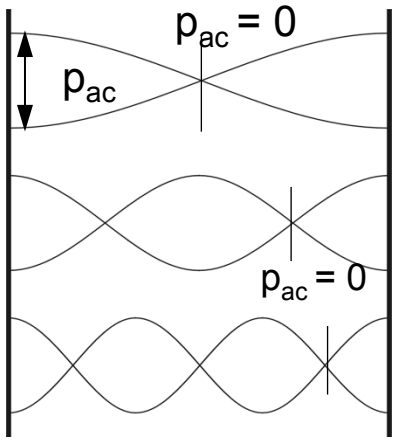
Product Presentation

ACTIVE
VELOCITY
ACOUSTIC
ABSORBER

Why is absorption necessary

- In a closed space, stationary waves can occur due to wall reflections.
- A simple “axial mode” is a reverberation where the room’s dimensions (L) contain an integer number of half wave length (λ/2).





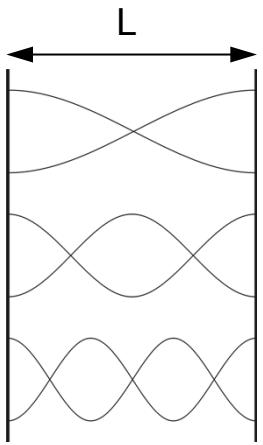
wave acoustic velocity ***and*** ***wave acoustic pressure***

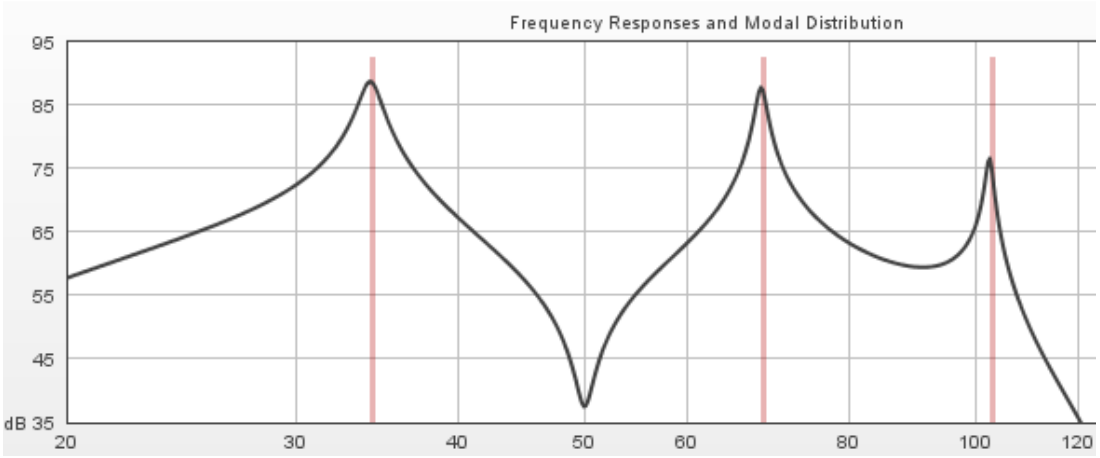
On a wall, the acoustic pressure is maximal and acoustic velocity minimal.

Why is absorption necessary

- Instant superposition of modal pressures create, at one frequency, the well know maximal and minimal acoustic pressure, depending of our position in the room:
  - pressure “peaks” or maxima create “keynote”,
  - pressure “nulls” or minima reduce homogeneity.

Both are causes of errors for the sound engineer.





microphone at 3/5 of the length of the room, L = 5 m

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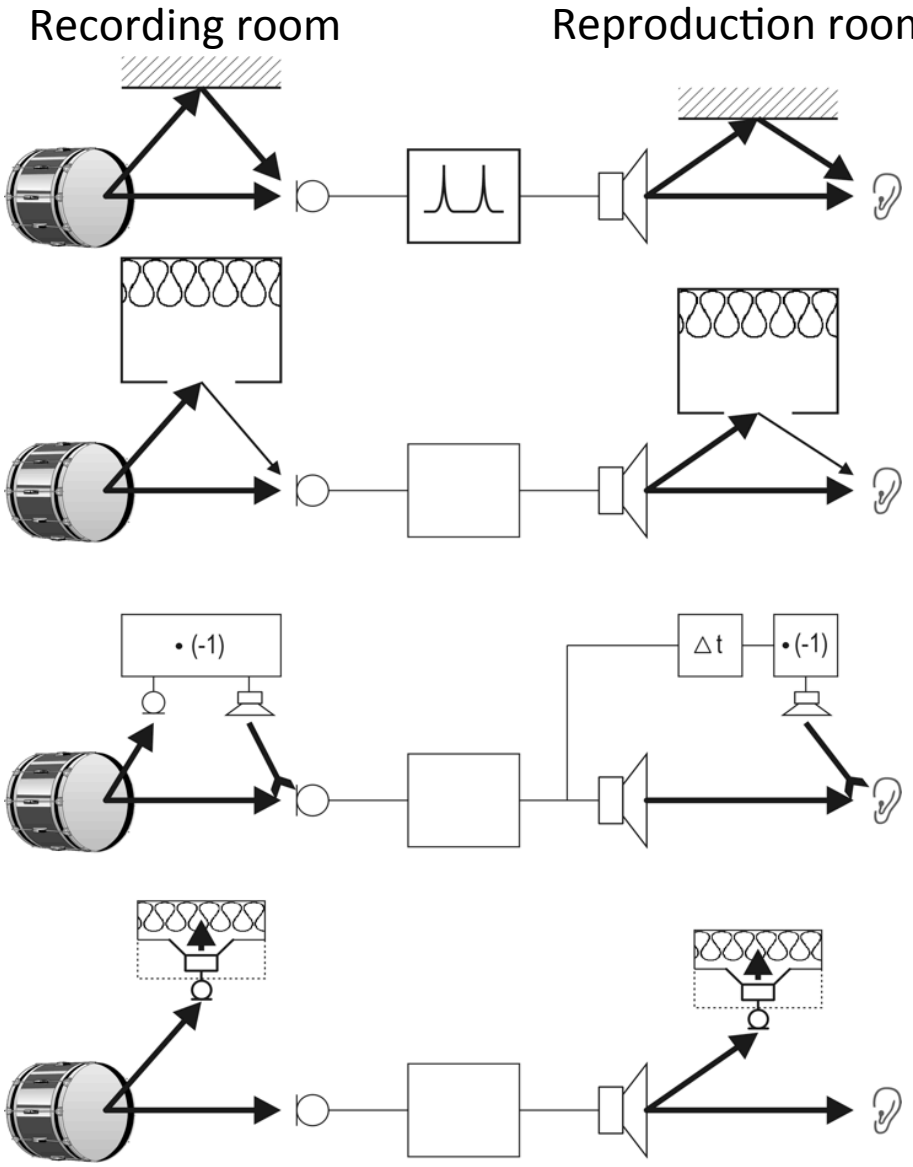
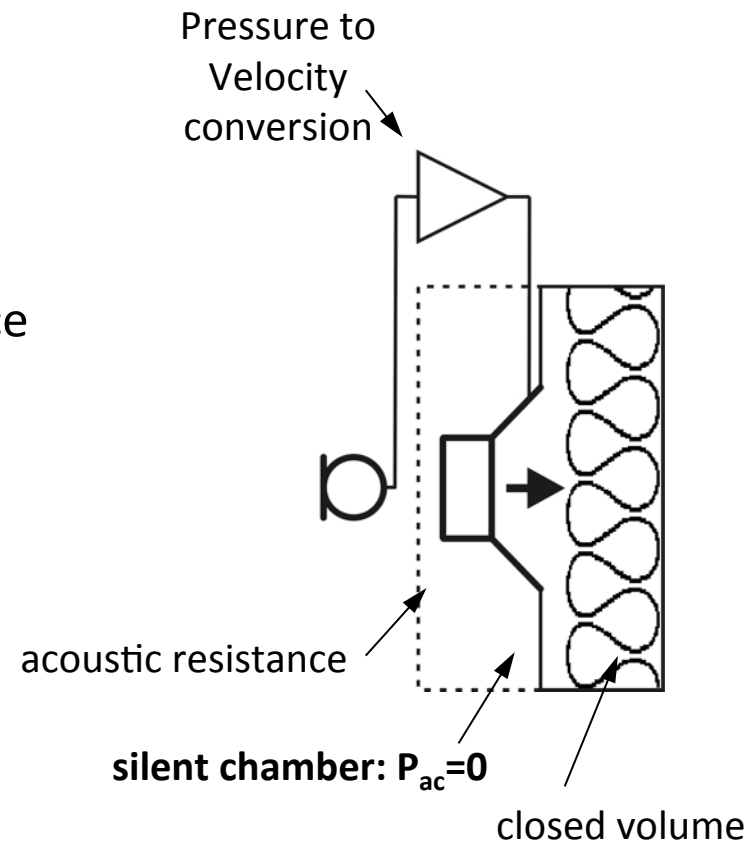
Different solutions to room modes

- EQ
- Bass-trap
- Noise cancelling
- AVAA or anti-wall



How does the AVAA work

- A microphone measures the acoustic pressure in front of an micro perforated sheet with specific acoustic resistance
- A electronic treatment uses this pressure to drive velocity through the acoustic resistance
- The transducer's acoustic velocity is set to achieve zero acoustic pressure behind the fabric, i.e. in the “silent chamber”.



- A **wall** transforms the energy of the acoustic velocity into energy of acoustic pressure
- The **AVAA** converts energy of the acoustic pressure into energy of velocity: we can therefore call it a “wall-suppressor”.

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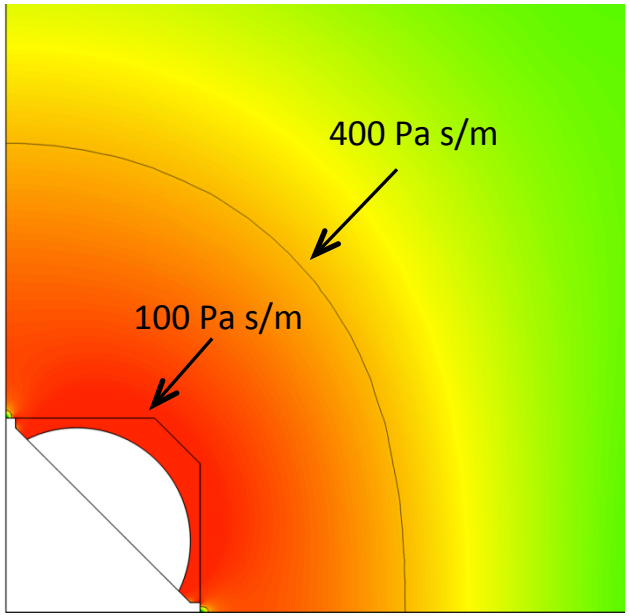
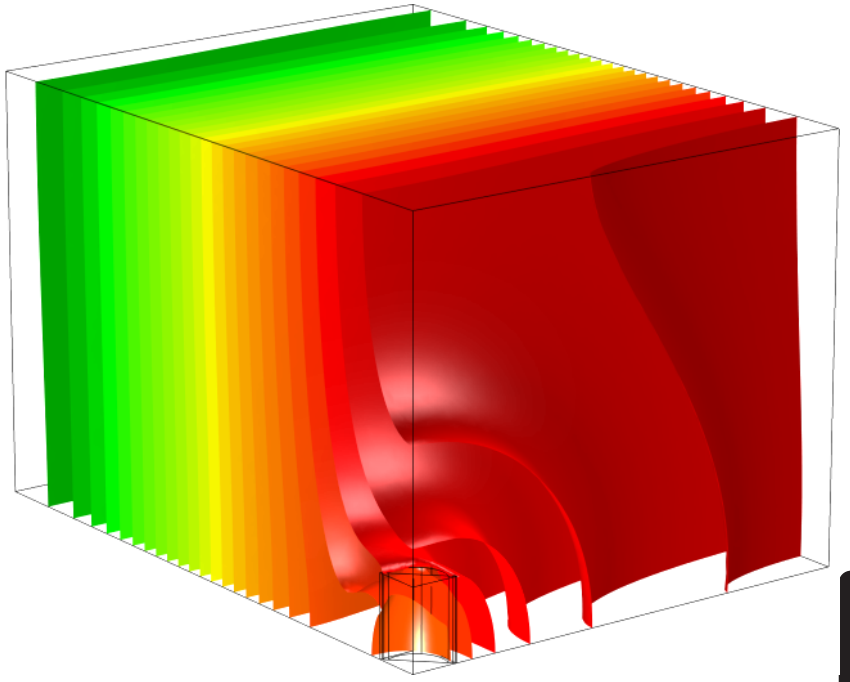
Simulations

- Simulations of AVAA in a room

Specific **impedance** with absorber ON



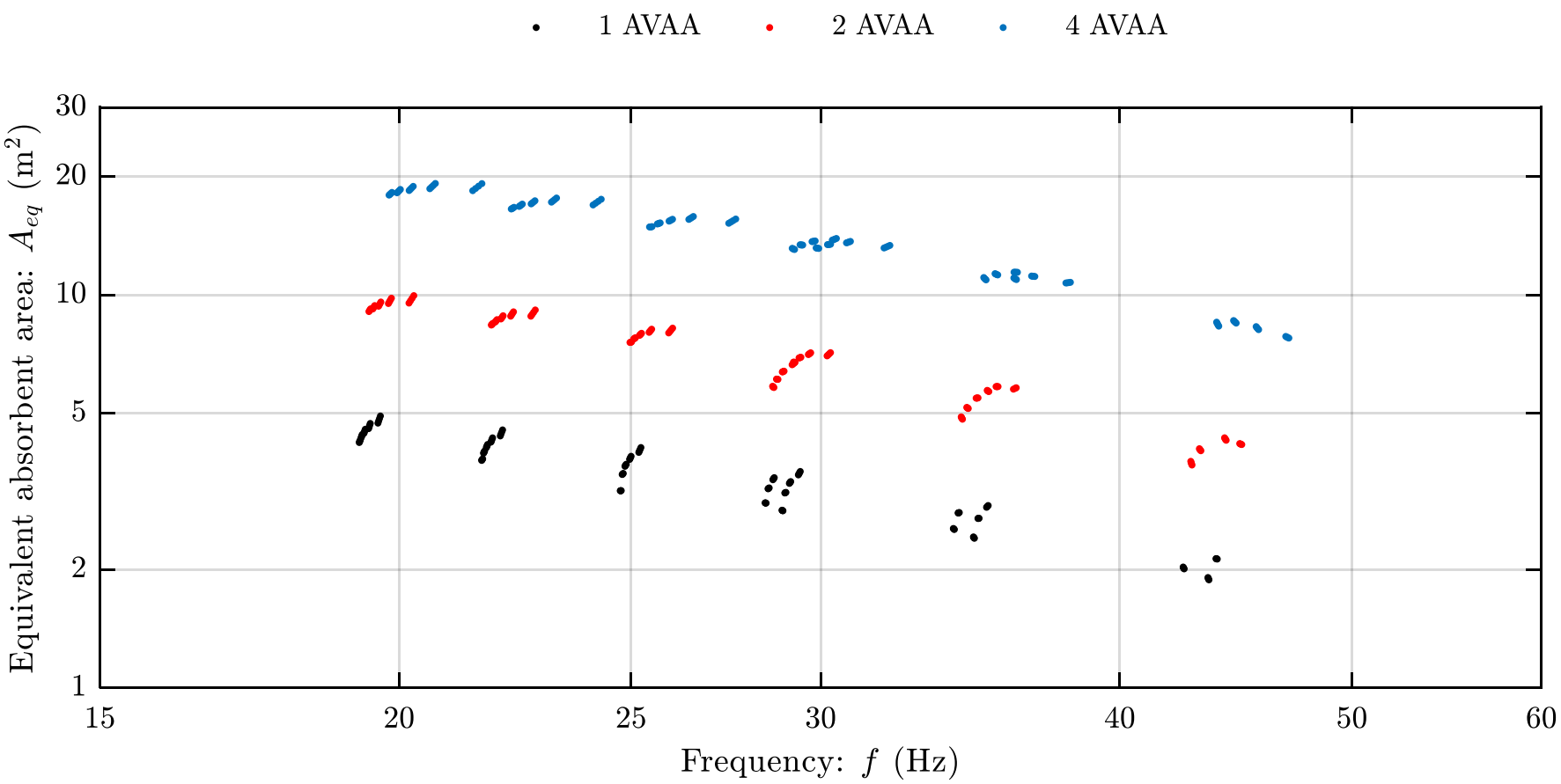
Pressure structure of the 1st mode with the absorber ON



Simulations

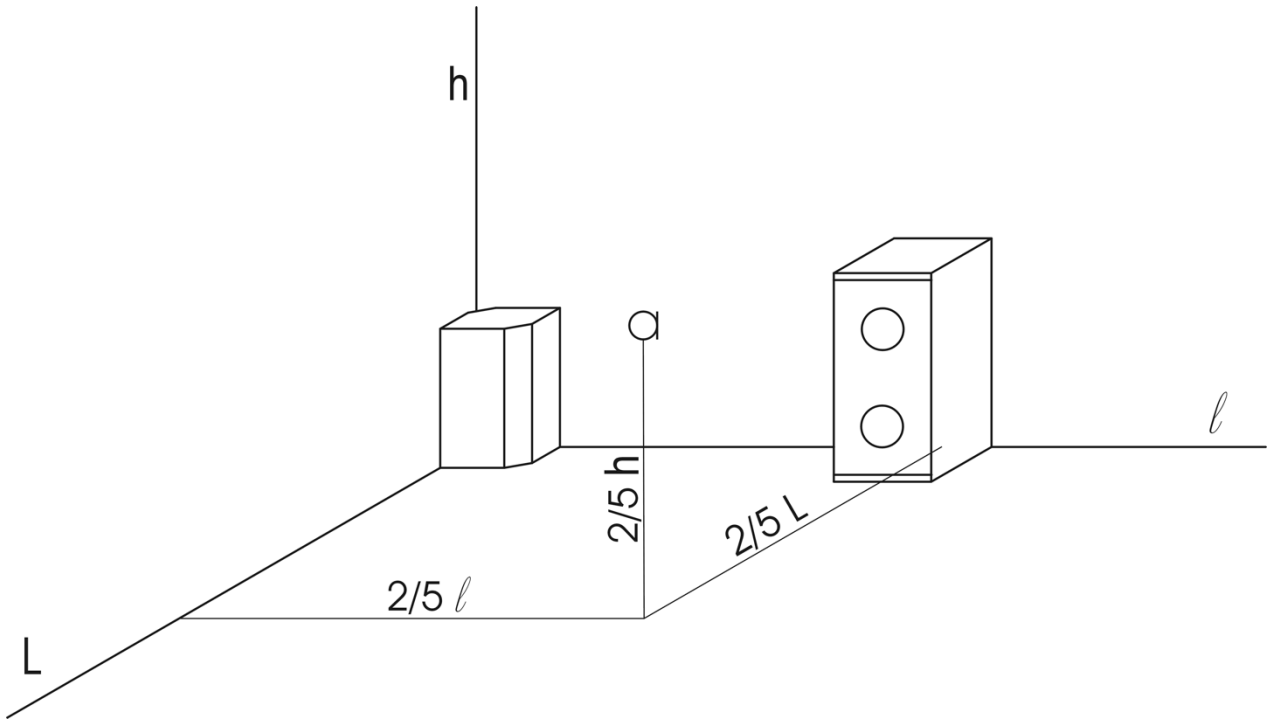
- First mode equivalent area in several simulated rooms from 6 m^2 to 54 m^2 with wall absorption coefficients from 0.05 to 0.125

$$A_{eq} = 0{,}16\ V \left[\frac{1}{T_{on}} - \frac{1}{T_{off}} \right]$$



Tests and results

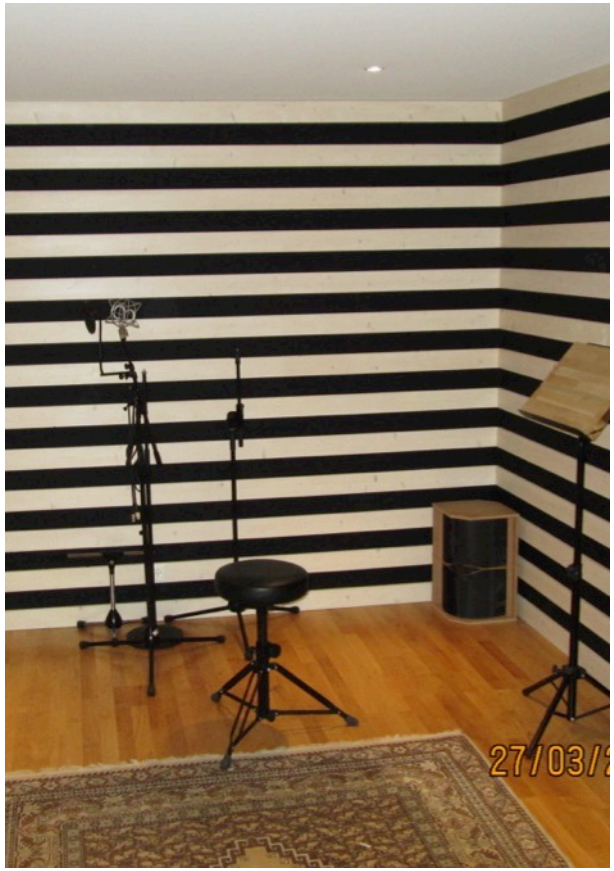
- For testing, 4 AVAA were positioned in the corners on the floor of the studio.

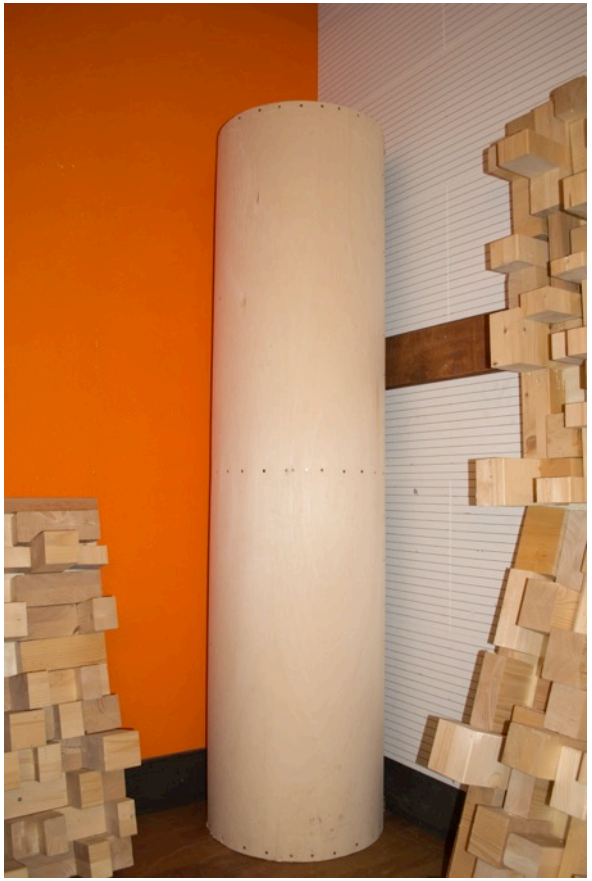


Tests and results

- The AVAA, smaller than 50 dm^3,…

…is compared to a bass trap of over 500 dm^3.





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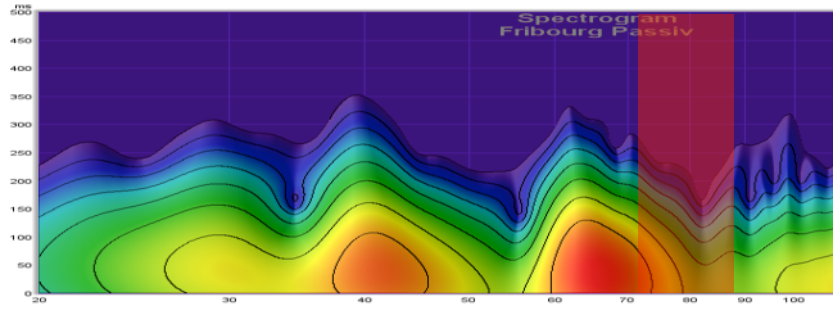
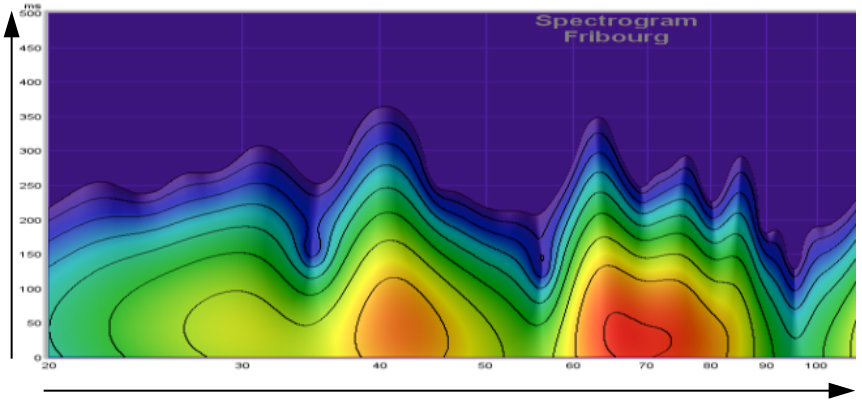
Tests and results

- Absorbing wall **with BASS TRAP**



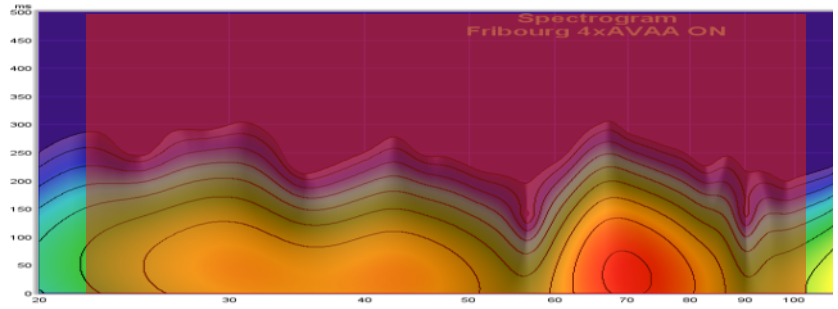
Time: 0.5 s

- Absorbing wall alone



20-120 Hz

- Absorbing wall **with AVAA**



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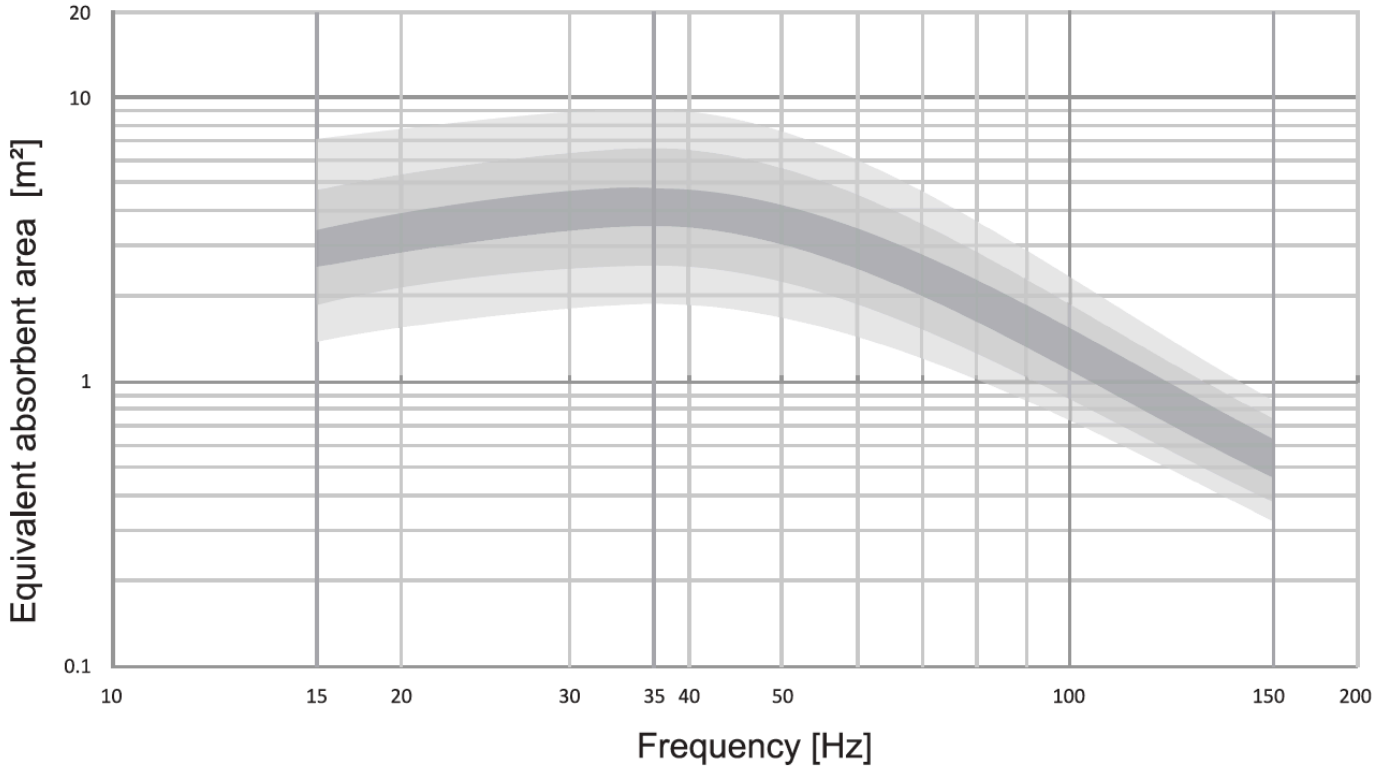
Tests and results

- Starting from measured and simulated extinction time of the natural modes, we computed the equivalent absorbent area A_{ae} using the Sabine's formula
- **Result:** One AVAA, with an acoustic resistance of **0.2 m²** represent an equivalent absorption area of **0.6 to 4 m²** i.e. **factor 4 to 20** depending on frequency and position**.**



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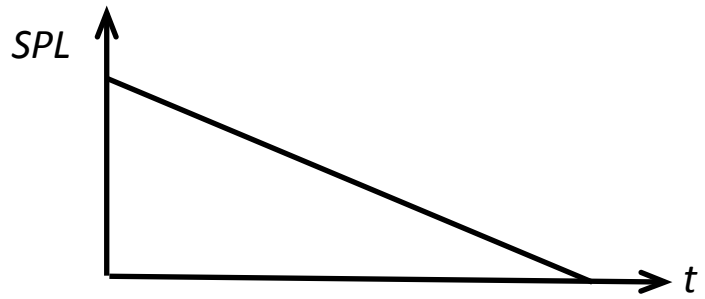
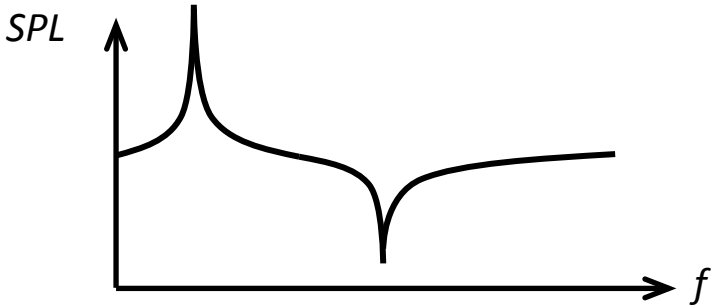
Tests and results

- A specific mode influences the auditory perception in time, frequency and space.



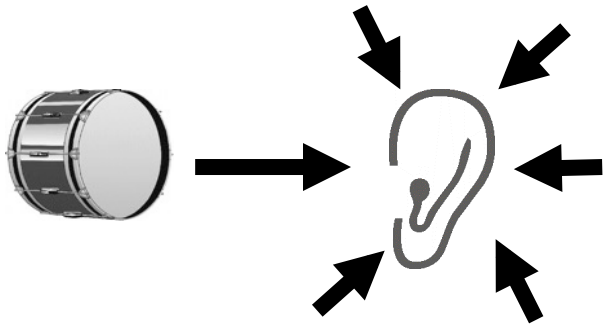
Time:

the pulse is extended.



Frequency:

pressure “peaks” create “keynote”,
pressure “nulls” reduce homogeneity.



Space:

sound is perceived as a hum coming from everywhere and nowhere.

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How Many and Where?

How many?

- 2 AVAAs will have a significant impact in most rooms (20 to 80 m2)
- More AVAAs may be used for better results or/and in larger rooms

Where to position them easily?

- AVAAs positioned **in corners** are effective on more room modes
- AVAAs located **against rigid walls** are more effective
- AVAAs located **behind the speakers** are more effective

How to position them with measurements?

1. **Identify** the problematic **room modes**
   (time domain frequency response or synthesizer)
2. **Identify** the **highest pressure zones** for each room mode
   - Play sinus corresponding to room modes
   - Walk around room walls, listen or measure pressure levels
3. **Position AVAA at highest pressure level zones**

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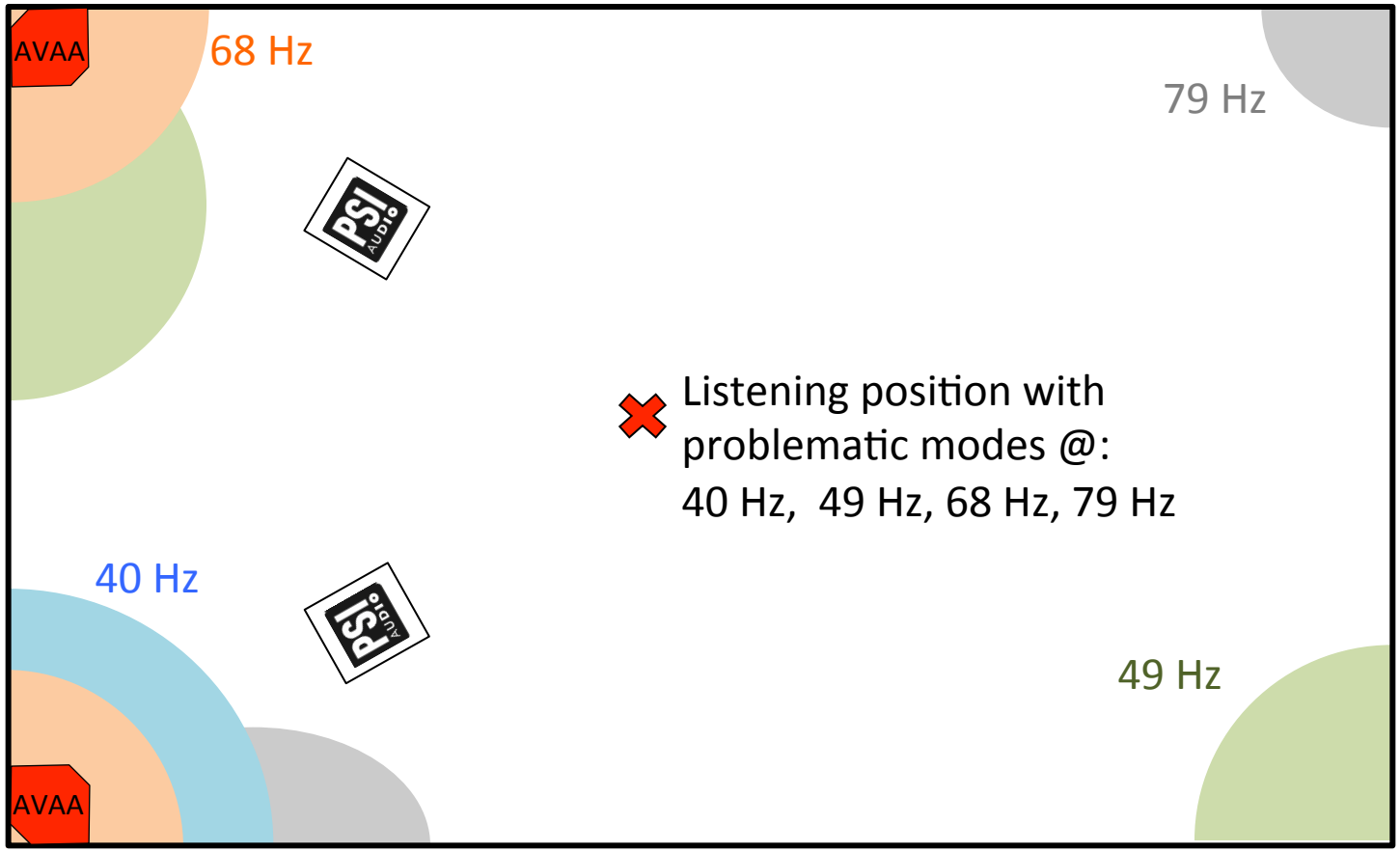
Positioning the AVAAs



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Advantages and Limitations

Limitations:

- Effective from 15 to 150 Hz
- Not a total solution for full treatment of rooms and needs to be combined with passive absorption for higher frequencies
- Most effective on low frequency room modes
- Will have no effect on first reflections away from AVAA position
- Effect will depend on room dimensions and characteristics as well as position of AVAA

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Advantages and Limitations

Key Advantages:

- Stable with no setting or calibration required
- No sound emitted
- No alteration of direct sound
- Significantly reduces modal reverberation time in low frequencies:
  - More accurate and “tighter” bass
  - More accurate frequency response (less peaks, nuls, masking)
  - More accurate localisation in sound image
- Can easily be switched on and off to adapt the acoustic environment
- Modular, small footprint, movable asset

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