

# Sound Absorption for a Predefined Frequency Range



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## Introduction

It is efficient to predict the effect of sound absorbing materials in advance for specific noise problems. For conventional sound absorbing materials, such as glass wool or foams, this is not an easy task. Therefore a well-defined wall with a uniform distribution of resonators has been developed.

The acoustic behaviour of a sound absorbing wall with **quarter-wave** resonators has been investigated previously.<sup>1</sup> The wall can be optimized for a high sound absorption at a specific frequency (see Figure 1).

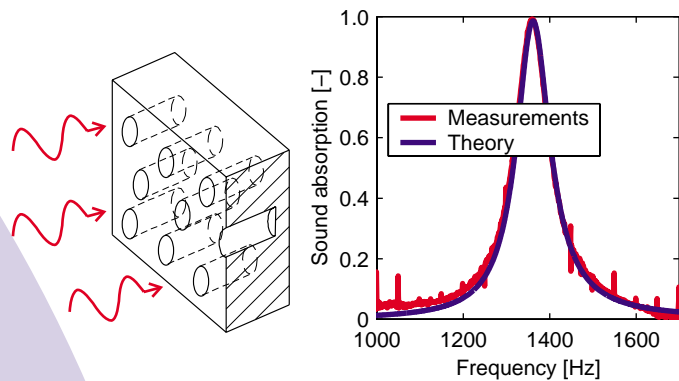


Figure 1. Optimized sound absorbing wall.

## Broadband sound absorption

In general noise has a broadband frequency spectrum. With the help of resonators, consisting of coupled tubes, a broadband absorption can be obtained. In Figure 2 a number of coupled-tubes-resonators is shown. The design and distribution is calculated with a special purpose program.

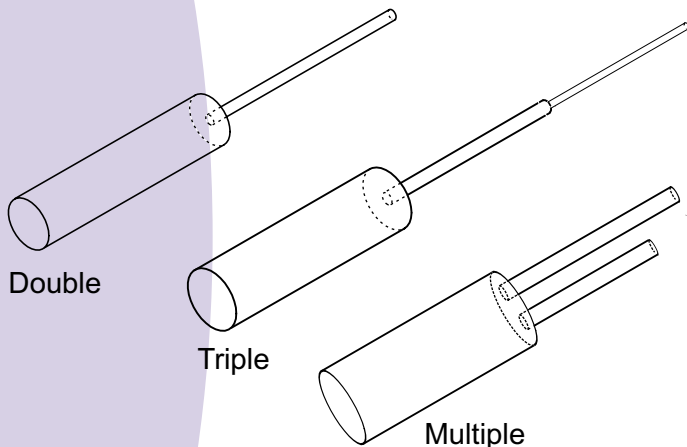


Figure 2. Resonators consisting of coupled tubes.

## Numerical & Experimental results

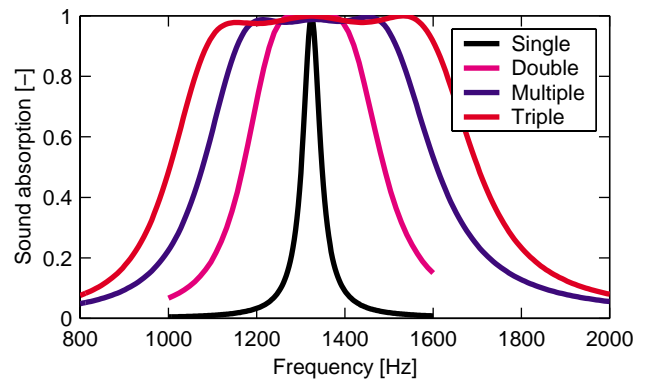


Figure 3. Predicted sound absorption of a wall with resonators.

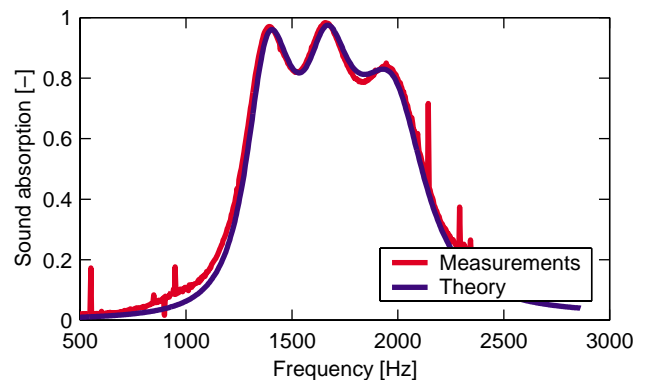


Figure 4. Numerical and experimental sound absorption of a specific sample (dimensions in mm).

## Conclusions

A design tool has been developed to create broadband sound absorption with resonators for a predefined frequency range.

The design tool has been validated with experiments.

## References

- 1 van der Eerden, de Bree, Tijdeman, 'Acoustics of a Sound Absorbing Wall', poster and presentation at first EM symposium, Rolduc, 1998
- 2 van der Eerden, Tijdeman, 'Acoustic impedance of coupled tubes including viscothermal effects', Inter-Noise 99, Ft Lauderdale, 1999

