Additively Manufactured Sound Absorbers

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Testing Methodology

3D Printed Sound Absorbers

Impedance Tube Diameter: 3.9 in

ASTM E1050

Loudspeaker → 3D Printed Sample

microphones → transfer function

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Overview

3D Printed Sound Absorbers

• Stackable Resonator
• Modular Helmholtz Resonator
3D Printed Sound Absorbers

Length of Tube: 7.44 in
Total Tube Length: 8.44 in
Stack of:
1 disk ≈ 400 Hz
2 disks ≈ 200 Hz
3 disks ≈ 133 Hz
4 disks ≈ 100 Hz

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Stackable Resonator

3D Printed Sound Absorbers

Stackable Resonator Configuration
Each slice is 1 in. thick
Stackable Resonator

3D Printed Sound Absorbers

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Stackable Resonator

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Sound Absorption of Stackable Resonator

Sound Absorption(%/100)

Frequency (Hz)

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Modular Helmholtz Resonator

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3D Printed Sound Absorbers

Absorption of Stackable HR Resonator

Sound Absorption (%/100)

Frequency (Hz)

- 1 Ring
- 2 Rings
- 3 Rings
Summary

3D Printed Sound Absorbers

• Only beginning to tap the potential for 3D printed sound absorbers.
• Stackable resonators provide an option to deliver absorbers tuned to the frequency ranges of greatest interest.
• Interchangeable modular resonator?