ACOUSTIC ABSORPTION PROPERTIES OF GRANULATED AEROGEL COMPOSITES

By

Matthew Philip Azevedo

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Approved:

Dr. Ning Xiang, Thesis Adviser

Dr. Jonas Braasch, Thesis Adviser

Dr. Ivan Markov, Thesis Adviser

Rensselaer Polytechnic Institute
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ABSTRACT

Creating a space suitable for critical listening is a significant challenge due to the limitations of current acoustic absorbers. Current broadband absorbers are generally ineffective at low frequencies unless they are physically large. Resonant absorbers can be designed to absorb low frequencies, but are narrow-band devices, requiring many overlapping absorbers for broadband effectiveness. This research will explore the potential to significantly improve the low frequency performance of broadband porous absorbers by constructing them from aerogel, a material with unique nanoscale properties. In monolithic form, aerogel is too costly to be practically used in acoustic applications. Recently, a cost-effective technique for producing granular aerogel has been developed, but the acoustic properties of granulated aerogel were not well known. This research has determined the direct incident acoustic absorption, the complex impedance, and the complex transmission coefficient of three configurations of granulated aerogel by means of the transfer function method of measuring normal in-duct acoustic properties: using the granules as a loose fill, woven into glass fiber blankets, and bound into a solid plate with a poly-vinyl acetate binder. An impedance tube was built to allow for the very low frequency measurements required for this investigation.