Abstract Submitted
for the CUWIP22 Meeting of
The American Physical Society

Comparing Theoretical Models of Speed of Sound Attenuation in Corrugated Tubes[1] ALEXANDRA LEE, University of North Carolina at Asheville — The group velocity of sound waves traveling through a periodically corrugated tube is lowered by an amount which depends on the physical parameters of the corrugations. There are two models which relate the physical parameters of the corrugations to the reduction in the group velocity- one well-documented based on acoustical engineering and the other with foundations similar to Bloch Theory. In the latter case, the 1-dimensional wave equation is used to find frequencies that would be resonant in the periodically corrugated tubes. Using the linear relationship between frequencies and sound velocity, we could then find the effective velocity of sound throughout the tube. This project analyzes the effect of modifications on the physical parameters of the corrugations based on these models. Numerical calculations performed in Mathematica are investigated to find corrugation types which show the greatest discrepancies between the two models. Theoretical predictions can be compared to experimental results from 3D printed tubes specially designed to test the veracity of these models.

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Date submitted: 11 Jan 2022 Electronic form version 1.4