

Abstract for 159th Meeting of the Acoustical Society of America

Structural Response to Low Amplitude Sonic Booms

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Two highly instrumented homes have been ensonified by low amplitude sonic booms. The resulting measurements have been analyzed 1) to gain insight to the dominant physical acoustics associated with sonic booms heard indoors, and 2) to rank order the mechanisms needed for high quality auralizations. The mechanisms turn out to be both clear and elegant. Diffraction loading on the exterior surface is as expected with an enhancement around $ka = 1$ on the incident side of the home, and a strong shadow zone at higher non-dimensional frequencies. The resulting pressure loading induces modal vibration of the walls, ceiling and windows; each of which show their first flexural modes at frequencies below 20 Hz. The walls themselves appear to break up into multi-layered wave bearing structures around 100 Hz, above which the nonlinear contact and sliding mechanisms take on a dominant role in the signature. These insights have been combined to motivate a low dimensional tool for auralizing the complete audio bandwidth of booms heard indoors.

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Suggested for special session on Sonic Boom

Technical Area: Physical Acoustics

PACS Subject Classification number(s): 43.20Px, 43.25Ts, 43.55Br, 43.55Rg

Method of presentation: Prefer lecture but willing to give as poster

Ethical Principles: "I certify that I have complied with ASA Ethical Principles"

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