ASA Fall 2019

View Abstract

CONTROL ID: 3153592**TITLE:** Reverberation time and audibility in phased geometrical acoustics using plane or spherical wave reflection coefficients**AUTHORS (FIRST NAME, LAST NAME):** Matthew Boucher¹, Monika Rychtarikova², Lukas Zelem³, Bert Pluymers⁴, Wim Desmet⁴**INSTITUTIONS (ALL):** 1. Structural Acoustics Branch, NASA Langley Research Center, Hampton, VA, United States.

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ABSTRACT BODY:

Abstract (200 words): In acoustical spaces, room acoustics parameters are often predicted using energy-based geometrical acoustics. For smaller rooms, interference among coherent reflections is taken into account by phased geometrical acoustics, which improves results for lower frequencies. The use of a spherical wave reflection coefficient improves the results further, yet the impact on room acoustics parameters is not fully known. This work focuses on the differences in predicted reverberation time when using plane or spherical wave reflection coefficients. The differences are analyzed for a variety of boundary conditions, including non-uniform distributions of absorption, in medium-sized rooms using a phased image source model. Since calculated differences are greater than the conventional just-noticeable-difference of 5% for reverberation time, a laboratory listening test is performed to confirm audibility of the modeled differences. Two narrow band noise stimuli (octave bands with central frequency 125 and 250 Hz) with a duration of 1 s were used for comparisons of 18 acoustic scenarios by means of a three-alternative forced choice method (3AFC). More than half of the listeners could hear the differences in all 36 cases. Statistically significant results (chi-squared test was used) were found in two thirds of the cases, corresponding to those with longer reverberation times.

CURRENT TECHNICAL COMMITTEE: Architectural Acoustics**CURRENT SPECIAL SESSION. IF NOT SUBMITTING TO A SPECIAL SESSION, CHOOSE "NONE****SELECTED.":** Room Acoustics Modeling and Auralization**PRESENTATION TYPE:** Invited Submission : Lecture**PRESENTER:** Matthew Boucher**AWARDS:****AV Equipment:** (none)**AUTHORS (ADDRESS & EMAIL):****Name:** Matthew Boucher**Address 1:** MS 463**Address 2:** (none)**City:** Hampton**State:** VA**Postal Code/Zip:** 23681-2199**Country:** United States**E-mail:** matthew.a.boucher@nasa.gov

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