MODELING THE EFFECTS OF DESK CHAIRS ON CLASSROOM REVERBERATION TIME

By

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ABSTRACT

Computer modeling of room acoustics is fast-becoming a standard tool for acoustical researchers, technicians, and consultants. Reliable and realistic results from computer models depend, in part, upon the accuracy and robustness of the data given for the surface properties within the model. Spurred in part by the recent attention given to classroom acoustics, the need for proper sound-absorption data of classroom desk chairs is pressing. In this work, absorption coefficients are sought by means of two main experiments: *in situ* room-acoustics measurements in both occupied and unoccupied classrooms under different chair configurations, and reverberation chamber measurements, occupied and unoccupied. Classroom RT measurements show that desk chairs noticeably change the reverberation time (RT) of the sound field in a classroom, but not necessarily from pure sound absorption. CATT-Acoustic simulation software is used to verify the validity and usefulness of these room-acoustic measurements, and is shown to accurately predict room reverberation time in classrooms in conjunction with absorption coefficients of occupied desk chairs found in a reverberation chamber. Scattering coefficients are refined for desk chair seating surfaces to give optimized computer prediction results of RT which are accurate to within one difference limen (5%). Results suggest that Sabine/Eyring-type approximations are not appropriate for accurate RT prediction in classroom settings as they under-predict RT across all octave bands, and the difference is noticeable according to a 5% Just Noticeable Difference. CATT-Acoustic models are calibrated to match measured RT values to within under one difference limen for RT.