

ACOUSTICS2008/961 Investigations on real-size coupled rooms based on Bayesian estimation method

Zuhre Su^a, Dave Woolworth^b and Ning Xiang^c

^aRuss Berger Design Group, 4006 Belt Line Road Suite 160, Addison, TX 75001, USA

^bOxford Acoustics, Inc., 356 CR 102, Oxford, MS 38655, USA

^cRensselaer Polytechnic Institute, Greene Building, School of Architecture, 110 8th Street, Troy, NY 12180, USA

As a case study, this work aims to experiment coupled-volume systems with scientifically grounded quantifiers using Bayesian analysis, a reliable analysis method in evaluating effects of different parameters on sound energy decays of coupled rooms [Xiang & Goggans, *J. Acoust. Soc. Am.* 110 (2001), pp.1415 - 1424]. This research uses the well-defined indicators developed by Xiang & Goggans to assess sound energy decays in a real-size hall. Derived from the model-based Bayesian inference, level differences (ΔL), diverse decay times, and decay time ratios are the quantitative descriptors of sound energy decays in acoustically coupled spaces. The room impulse responses of Howorth Theater in Oxford, Mississippi coupled to the adjacent lobby are experimentally measured in the case study. The two rooms are connected with two separate apertures and have distinct natural reverberation times that allow experimenting different setups for probable acoustical coupling at certain locations. In this paper, frequency, and location dependence of double-slope characteristics of sound energy decays are discussed.