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## Bayesian model selection applied to room-acoustic energy decay analysis

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The previous work of Xiang et al. [Xiang & Goggans, *J. Acoust. Soc. Am.* 110 (2001), pp. 1415-1424; 113 (2003), pp. 2685-2697; Xiang & Jasa, *J. Acoust. Soc. Am.* 120 (2006) pp.3744-3749] successfully applied the Bayesian formulism to estimate multiple decay parameters from Schroeder decay functions measured or calculated in acoustically coupled spaces. In this work we consider a more difficult problem of determining the correct decay model in the presence of energy decay data within the Bayesian framework. We will compare the Annealing/Thermodynamic algorithm [Neal, R. M., *Statistics and Computing* 11 (2001), pp. 125-139], the Nested Sampling algorithm [Silvia & Skilling, *Data Analysis: A Bayesian Tutorial*, Oxford Science Publications (2006)], and a combined Variational/Markov Chain Monte Carlo approach in order to determine the correct decay model. The advantages/shortcomings of these methods are discussed in the context of the decay model selection and parameter estimation using experimentally measured data from real coupled spaces.