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Proposition of new acoustical parameters to analyze the 3D spatial composition of sound in music spaces

Alban Bassuet
Arup Acoustics, 155 avenue of the americas, New York, NY 10013, USA

From acoustic measurements conducted in more than 100 renowned historical music spaces, for the Constellation Project, this paper proposes new acoustical parameters created to better describe the 3D spatial composition of sound in music spaces. Using B-format recordings, the author is proposing a visualization algorithm to plot the acoustic intensity at specific time frames and ranges. The acoustic energy is decomposed into relevant space segments and energy ratio parameters LH (lateral frontal high versus lateral frontal low), and FR (lateral rear high versus lateral rear low) are deduced and proposed for analyzing the distribution of sound and the envelopment characteristics of the room. Examples of intensity plots and of the proposed 3D acoustical parameters are given for various room types ranging from small to large concert halls, small to large opera houses, famous organ churches and Roman basilicas.