



## **Timbre Related Geometry Analysis of Classical Guitars**

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The timbre of acoustic guitars is an interaction between cultures, musicians and instrument makers since centuries. The main goal in this investigation is to use shape and frequency data to determine the radiation behaviour through specific changes of the geometry for the different body components. Using a 121 microphone array the radiation pattern of 32 classical guitars are measured and backpropagated. Here the eigenvalues and the forced-oscillation pattern are calculated, the latter covering each plucked note from open keys up to the 12th fret. Furthermore the data of the geometry shapes has been documented. During the research 78 radiated forced-oscillation patterns and their related frequencies, the spectral centroids, the influence of curving and thickness of soundboards, aging of the instruments and used tone wood were examined.