Accessing the homogeneity of guitar tones

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ISMA2014/133
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One of the issues faced by classical guitar makers and players is to avoid highly pronounced discrepancies in terms of intensity and decay when moving from a note to the next or a close one. For instance, the so-called ”dead tones” phenomenon often occurs in the high treble range (first string), where some tones appear to be decaying significantly faster. A first study (Ricateau et al 2012) has evidenced this particular aspect by measuring the Energy Decay Curves and conducted an analysis thanks to the measurements of the mechanical admittance at the bridge. Our study proposes a measurement scenario to obtain a more complete picture of a particular instrument from the lower bass range to the high treble range. This scenario is intended to be undertaken in the maker’s workshop, leading to a characterization of the instrument available in a reasonable time laps. The analysis relies on robust and precise signal processing tools, namely High Resolution method, applied both for estimating decaying properties of each tone and decomposing the mechanical admittance. The synthesis model initially proposed by J. Woodhouse (Woodhouse, Acta Acustica, 2004) is then employed for accessing the assumption that the homogeneity properties mostly originates from the coupling conditions at the bridge, namely the values of the admittance matrix around the string partial frequencies.