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Categorization of guitars from bridge admittance measurements

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The acoustical characteristics of the guitar depend on the instrument makers' choices concerning the geometry, the material and the assembly techniques. The aim of this paper is to define criteria permitting the discrimination of guitars according to their acoustic characteristics. These criteria can be used, for example, by instrument makers to test the repeatability of their making process. Evaluation of the guitars' quality from this categorization is beyond the scope of this paper. A low-cost portable system allowing bridge admittance measurements has been designed and used on 4 groups of classical guitars, each being composed of about 10 similar instruments. A statistical study shows that the tested instruments can clearly be differentiated according to (1) the modal parameters associated to the first 2 vibroacoustic modes (air mode A0 and first soundboard mode T1), and to (2) a 'merit indicator', close to the one defined by C. Barlow (Proc.I.O.A., vol 19, Pt 5, 1997, 69-78). This 'merit indicator' is computed from the mean value of the bridge admittance and an estimation of the critical frequency of the soundboard.