

The frequency spectrum and time frequency analysis of different violins classification as tools for selecting a good-sounding violin

ABSTRACT

This work evaluates four violins from three distinct manufacturers, notably Eurostring, Stentor, and Suzuki, using a scientific approach. Eurostring1 and Eurostring2 were the names given to the two Eurostring units. The purpose of this study is to identify elements in various violins that could be used as tools for selecting a pleasant-sounding violin by having them classified by a professional violinist. The signal's time varying frequency was evaluated using a frequency spectrum and a time frequency plane, and the combination of frequency spectrum and time frequency domain is utilised. PicoScope oscilloscopes and Adobe Audition version 3 were used to record the acoustic spectra in terms of time and frequency. The time frequency plane is identified, and time frequency analysis (TFA) is produced by Adobe Audition spectrograms. The sound was processed in order to generate Fast Fourier Transform analysis: Fourier spectra (using PicoScope) and spectrograms (using Adobe Audition). Fourier spectra identify the intensity of the fundamental frequency and the harmonic spectra of the overtone frequencies. The highest frequencies that can be read are up to and including the 9th overtone. All violins have a constant harmonic overtone pattern with an uneven acoustic spectrum pattern. Eurostring1 showed inconsistent signal in the string G with 6th and 7th overtone missing, whereas Eurostring2 lack of the 6th overtone. Among the string D, only Eurostring1 display an exponential decay for the overtone. All the string A except for Suzuki showed nice and significant peak of fundamental and overtone. Stentor displays up to the 5th overtone. Among the string E, Suzuki showed inconsistent harmonic peak intensity. TFA revealed that the fundamental frequency of string E for Eurostring1 was lower than the first overtone. Only Eurostring1 has an uneven decay for the overtone frequency, whereas Eurostring2 exhibits a large exponential decay for the overtone frequency.

Keyword: Acoustic spectra; Frequency spectrum; Harmonic overtone; Time frequency analysis; Violin instrument classification