Study on the Spectrum of Violin and Other Instruments Using Computational Simulations HEEKYOUNG WOO, RICHARD KYUNG, Choice Research Group — Most sounds are comprised of a complex mixture of vibrations. An intricate combination of high notes and low notes make up the integrated sound of melodious music. In this paper, a sound spectrum of violins is presented as a graph of power as a function of frequency, and it is compared to spectra of other instruments such as piano, cello, flute and trumpet. By examining the spectrum of the note, a number of prominent components at a special set of frequencies are observed using the Matlab program. Several instruments have strong energy in the harmonics other than in the fundamental frequency. For example, the flute and piano show the least harmonics and some other instruments have most of their energy in the first and third, or fifth harmonics rather than the base frequency; however, string instruments have relatively strong third harmonic components. Therefore, these characteristics can be used to synthesize artificial sound of instruments to test a performance of the sound quality, and even to identify individual instruments when the instrument is played in an orchestra.

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