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Measurement of direct radiation from violin excited by force hammer impact at bridge

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A violin suspended inside a small anechoic chamber was impacted at the bridge with a small force hammer. A rotatable, semicircular, equispaced seven-microphone array was used to measure the radiation in a 0–2 kHz range over a sphere of radius 30 cm (in the near field (r<l) region for *f*<1100 Hz) at 15° intervals (except in the neck-fingerboard region). The input-force-normalized microphone spectra were then analyzed to separate the contributions from each violin normal mode. On animation, most of the higher-frequency radiation patterns clearly showed apparent ‘‘phasiness’’ among portions of the radiation patterns, an effect primarily related to near-field effects and not the bridge impulse propagation delay through the violin corpus. The measured 3-D radiation patterns for each mode compared well with those calculated with a boundary element program using as input normal mode vibrational data from a prior modal analysis for this violin.

Topics

Microphone array, **Architectural acoustics**, **Musical instruments**, **Modal analysis**, **Radiation patterns**