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Directional Recording and Analysis of Sounds from Musical Instruments

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The sound of musical instruments doesn't radiate omni directionally into the sound field. Moreover, each component of the sound (e.g. a partial) can have its own directivity pattern which, in turn, may also vary over time. In general, the radiated sound in free space will have a different timbre at different locations around the sound source. In many cases the description of a particular radiation pattern contour may not be valid for other instruments, tones, playing techniques or even the same musical gesture on the same instrument. Consequently, this work focuses on the synchronous capture and analysis of musical sound sources with a spherical microphone array. In order to analyze the directivity in its very detail, a spatial model for radiated sound is suggested. Assuming coherent signals, a common signal decomposition is applicable. The relations between the signal components yield the desired directivity patterns. Spherical harmonics interpolation between the discrete measurement points allows for the estimation of the radiation in a continuous angular space.