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PLEASE ATTACH A SUCCINT STATEMENT SUPPORTING THE NOMINATION:
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This paper presents a powerful signal processing framework for analyzing, processing, and encoding acoustic wave fields, based on a multidimensional spectral representation of the wave field over a spatio-temporal manifold. The paper also provides new results that establish a more comprehensive link between acoustics theory and signal processing, in particular by providing a definition of "frequency" on a space/time-frequency representation space. Strikingly, the paper shows that in general, the wave fronts can be expressed as a function of elementary directional components, most notably, plane waves and far-field components.

The study of wave fields has been traditionally carried out in acoustic theory with parametric representations in continuous domain. The paper establishes key results that bring acoustic wave fields to the realm of signal processing with a rich set of tools, including multidimensional spectral analysis and sampling, Gabor representation, perfect reconstruction filter banks, and efficient algorithms. Given the growing interest of high-fidelity 3D audio capturing and playback using multiple microphones and speakers, the paper will has a great impact in theory and application of this area.