

Arrays in motion – Localization techniques for the compensation of relative motion between microphone arrays and sources

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With the exact knowledge of the current positions of the microphones in an array and the potential noise sources it is possible to compensate relative motion between the array and the sources. Similar techniques have been used successfully in the past for the measurement of e.g. wind turbines and airplane flyovers. In this paper modifications of this approach with the focus on industrial application are presented.

The main interest of a vehicle pass by measurement is to extract the continuous noise levels of the dominant sources. With the use of advanced video processing or additional sensor information (radar, light barrier) it is possible to create a continuous tracking model of the vehicle. The scan grid in the beamforming algorithm is then recalculated to compensate the movement. In the resulting acoustic video the vehicle appears stationary and the evolution of the sound sources can be observed and auralized as input for psychoacoustic evaluations.

To get good spatial resolution and dynamics a large number of microphones is required especially for the higher frequency range to avoid spatial aliasing. A common approach to reduce the number of microphones is sequential scanning of the measurement object with a smaller array that is moved across the sound field using a traversing system. The major drawbacks are increased measurement time and limitation to stationary sound fields. In this paper a new array setup is presented allowing for fast measurements with sufficient resolution and dynamics even for transient noise events.

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