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Title:

Optimizing the Estimation of Vehicle Sound Radiation Characteristics by Combining Numerical Models and Microphone Array Measurements

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Abstract:

The rising societal emphasis on health-conscious and pleasing acoustic environments necessitates a more sophisticated approach to urban design and traffic management. To ensure effective design planning, we require robust mathematical models capable of accurately simulating diverse traffic environments, which comprise a mix of various vehicles and architectural structures. This study concentrates on the challenge of deriving reliable vehicle sound source characteristics, which are integral for the placement and auralization of those vehicles in simulated environments. Our solution incorporates a Bayesian Framework to optimally merge measurements from a planar array on actual vehicles with a range of numerical simulation models. This combination leads to enhanced precision in defining vehicle sound characteristics and to considerably less work since only a planar array is used, paving the way for more scalable measurements and accurate auralization in virtual environments, thereby contributing to improved urban planning and living spaces.

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