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A total generalized variation approach for near-field acoustic holography - DTU Orbit (09/11/2017)

A total generalized variation approach for near-field acoustic holography

Near-field methods based on microphone array measurements are useful to understand how a source radiates sound. Due to discretization errors, these methods are typically restricted to low frequencies. Sparse approaches have gained considerable attention, as they can potentially recover a seemingly under-sampled signal with remarkable accuracy, extending the valid frequency range. However, near-field problems are generally not spatially sparse, and it is more appropriate to promote block-sparse solutions (i.e. spatially extended) rather than direct spatial sparsity. In this paper, a method is examined that promotes solutions with sparse spatial derivatives. The method seeks spatially extended solutions, valid over a wide frequency range, and suitable to near-fields and extended sources. The methodology is based on a Total Variation approach using higher order derivatives. The frequency range of validity is examined, as well as the robustness to noise. The performance of different finite difference stencils is investigated. Numerical and experimental results are presented, with particular focus on the estimated power radiated by the source. The method is benchmarked against conventional approaches.

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