Abstract: Broadband microphone arrays have important applications such as hands-free mobile telephony, voice interface to personal computers and video conference equipment. The design problem can be tackled in different ways. One method is to use a physical model to pose the design problem as a Chebyshev minimax problem. If a $l_1$-norm approximation or the real rotation approach is applied, the minimax design problem can be further reduced to a semi-infinite linear programming problem. A numerical scheme using a set of adaptive grids is proposed. The design method is robust to source movement. The method can be applied to design multidimensional digital finite-impulse response (FIR) filters with arbitrarily specified amplitude and phase.

Another design method is to use sequences of calibration signals to achieve a specific performance. A method is proposed which can control and adjust speech distortion, noise suppression and echo cancellation easily. It turns out that significantly shorter filter length can be applied to achieve better overall performance than the least-squares method or the signal-to-noise plus interference method.

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