

Analysis of Two-Channel Generalized Sidelobe Canceller (GSC) with Post-Filtering

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ABSTRACT

In this paper, we analyze a two-channel generalized sidelobe canceller with post-filtering in non-stationary noise environments. The post-filtering includes detection of transients at the beamformer output and reference signal, a comparison of their transient power, estimation of the signal presence probability, estimation of the noise spectrum, and spectral enhancement for minimizing the mean-square error of the log-spectra. Transients are detected based on a measure of their local non-stationarity, and classified as desired or interfering based on the transient beam-to-reference ratio. We introduce a *transient discrimination quality* measure, which quantifies the beamformer's capability to recognize noise transients as distinct from signal transients. Evaluating this measure in various noise fields shows that desired and interfering transients can generally be differentiated within a wide range of frequencies. To further improve the transient noise reduction at low and high frequencies in case the signal is wideband, we estimate for each time frame a *global* likelihood of signal presence. The global likelihood is associated with the transient beam-to-reference ratios in frequencies, where the transient discrimination quality is high. Experimental results demonstrate the usefulness of the proposed approach in various car environments.

Keywords: Array signal processing, signal detection, acoustic noise measurement, speech enhancement, spectral analysis, adaptive signal processing.