

ABSTRACT

In this thesis, several techniques for narrowband radio frequency interference suppression in the presence of wideband sources are discussed. When spatial processing is used to suppress undesired signals, the number of sensor elements must be larger than the number of undesired signals. If the interference increases beyond the number of sensor elements, it may be advantageous to remove any narrowband interference before proceeding to spatial processing. Several methods of narrowband interference reduction are discussed.

Conventional frequency excision has been shown in the past to work well in the presence of narrowband interference. The received data is transformed to the frequency domain using a fast Fourier transform. A threshold is set, and any frequency bin with a magnitude larger than the threshold is zeroed. This method is found to be an insufficient algorithm when in the presence of wideband signals. Parameter estimation can be used to model the interference for subtraction, but will only work for single-tone signals. Polynomial fitting can also be used to model signals, but does not model interference with a significant bandwidth accurately enough for sufficient removal. It is found that frequency excision can be modified to perform more reasonably in the presence of wideband interference.

Modifying frequency excision so that the bins associated with the narrowband interference are nulled in the presence of wideband signals, frequency excision can

be made a robust algorithm in a changing interference environment. In addition to nulling the frequency bins with the largest magnitudes, bins adjacent to these will also be nulled so that all the energy associated with the narrowband interference is removed.