

## ABSTRACT

The performance of a radio frequency interference (RFI) suppression system based on space-time adaptive processing (STAP) is studied. STAP may be implemented digitally, in which case the choice for the sampling rate of the sensor outputs limit the ability of STAP to receive desired signals without distortion. In this study, an analytical model based on bandlimited incident signals and noise is used to evaluate the performance of STAP when the adaptive weights are calculated using simple power minimization, power minimization with a single directional constraint or minimum mean square error (MMSE) constraint.

In practice, the signal sampling is usually performed at a rate that is significantly above the bandwidth of the system or the desired signals of interest. It is demonstrated that when using simple power minimization or power minimization with a directional constraint with a weak desired signal present, sampling at the bandwidth of the system to decorrelate noise yields the best performance. Additionally, with a strong desired signal, undersampling the system and critically sampling the desired signal yields optimal performance. While constrained MMSE is much less affected by changes in the sampling rate, similar sampling rates are recommended in order to maximize its performance as well.

The use of proper resampling, or appropriate downsampling, of oversampled noise data is presented to show how optimal or near-optimal performance can be regained with STAP. It is shown that using real, filtered and resampled noise, the STAP performance can be significantly improved for the weight constraints studied in this work.