The Role of Difference Coarrays in Correlation Subspaces

The Data Model

- Normalized DOA:

\[ \vec{\psi}(\theta) = \frac{\cos(\theta) + j \sin(\theta)}{\sqrt{\cos^2(\theta) + \sin^2(\theta)}} \]

- Correlation subspace:

\[ CS = \text{col}(S(\rho)) \]

- Eigenvalues of \( S(\rho) \):

\[ u(\alpha) = \text{eig}(S(\rho)) \]

- Eigenvectors of \( S(\rho) \):

\[ \text{vec}(v(\alpha)) = \text{eig}(S(\rho)) \]

- Correlation Coarray Location

\[ \bar{\rho} = \frac{1}{2} (\bar{\rho} + \bar{\rho}^*) \]

- Discrete Prolate Spheroidal Sequences

- Redundancy averaging (Rectification)

Prior Knowledge about Sources [2]

\[ E(\mathbf{A}) = E(\mathbf{B}) = 0 \; \text{uncorrelated, equal-power sources} \]

Concluding Remarks

- Generalized correlation subspace
- Prior knowledge about sources.
- Redundancy averaging (Rectification).

References

- Liu and Vaidyanathan, "Redundancy averaging with prior knowledge of sources."
- Discrete Prolate Spheroidal Sequences [5].

Numerical Examples

- Normalized DOA

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