

Cross Power Density Spectrum and Cross-Correlation Function

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Based on
Probability, Random Variables and Random Signal Principles,
P.Z. Peebles, Jr. and B. Shi

Cross Power Spectrum and Cross Correlation

N Gaussian random variables

Definition

$$S_{XY}(\omega) = \int_{-\infty}^{+\infty} \left\{ \lim_{T \rightarrow \infty} \frac{1}{2T} \int_{-T}^{+T} R_{XY}(t, t + \tau) dt \right\} e^{-j\omega\tau} d\tau$$

Two truncated processes

N Gaussian random variables

Definition

$$X_T(\omega) = \int_{-T}^{+T} X(t) e^{-j\omega t} dt$$

$$Y_T(\omega) = \int_{-T}^{+T} Y(t_1) e^{-j\omega t_1} dt_1$$

$$X_T^*(\omega) Y_T(\omega) = \int_{-T}^{+T} X(t) e^{+j\omega t} dt \int_{-T}^{+T} Y(t_1) e^{-j\omega t_1} dt_1$$

