

A process $\{X(t), -\infty < t < \infty\}$ is **wide-sense stationary** if $EX(t)$ does not depend on t and $E[X(t + \tau)X(t)]$ depends only on τ .

Definition 11.27 For a wide-sense stationary process $\{X(t), -\infty < t < \infty\}$, the **autocorrelation function** is defined as

$$R_X(\tau) = E[X(t + \tau)X(t)]$$

which does not depend on t , and the **power spectral density** is defined as

$$S_X(f) = \int_{-\infty}^{\infty} R_X(\tau) e^{-j2\pi f\tau} d\tau$$

i.e.,

$$R_X(\tau) \rightleftharpoons S_X(f).$$