Assignment 13

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LATEX

Papoulis chap 9 Exercise 9.27

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Problem

9-27 Show that if $x(t)$ is white house, $h(t) = 0$ outside the interval $(0, T)$, and $y(t) = x(t) * h(t)$ then $R_{yy}(t_1, t_2) = 0$ for $|t_1 - t_2| > T$.

Solution

$$y(t)' = \int_{t-T}^{t} x(\tau)' h(t - \tau) \, d\tau \tag{1}$$

Hence, $y(t_1)'$ and $y(t_2)'$ depend linearly on the values of $x(t)'$ in the intervals $(t_1 - t, t_1)$ and $(t_2 - t, t_2)$ respectively. If $|t_1 - t_2| > T$ then these intervals do not overlap and since $E\{x(\tau_1)'x(\tau_2)'\} = 0$ for $\tau_1 \neq \tau_2$, it follows that $E\{y(\tau_1)'y(\tau_2)'\} = 0$.

CODES

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