Assignment 11

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Outline

Question

Show that if the processes x(t) and y(t) are WSS and $E(|\ x(0) - y(0)\ |^2) = 0$, *Then* $R_{xx}(\tau) \equiv R_{xy}(\tau) \equiv R_{yy}(\tau)$

Solution

An assumption
$E(|\, x^*(t) - y^*(t)\,|^2) = E(|\, x^*(0) - y^*(0)\,|^2) = 0$
Furthermore,

$$E(x(t+\tau)[x^*(t) - y^*(t)] = R_{xx}(\tau) \equiv R_{xy}(\tau) \equiv R_{yy}(\tau) \tag{1}$$

From equation

$$[R(\tau + \tau_1) - R(\tau)]^2 \leq 2[R(0) - R(\tau_1)]R(0)$$

If $R(\tau_1)$=R(0),then the right side is 0; hence the left side is also 0 for every τ.(2)we get

$$E(x(t+\tau)[|\, x^*(t) - y^*(t)\,|^2] \leq E(|\, x(t+\tau)\,|^2)E(|\, x^*(t) - y^*(t)\,|^2) = 0 \tag{3}$$

Hence ,$R_{xx}(\tau) + R_{xy}(\tau) = 0$; *Similarly*, $R_{yy}(\tau) = R_{xy}(\tau)$