

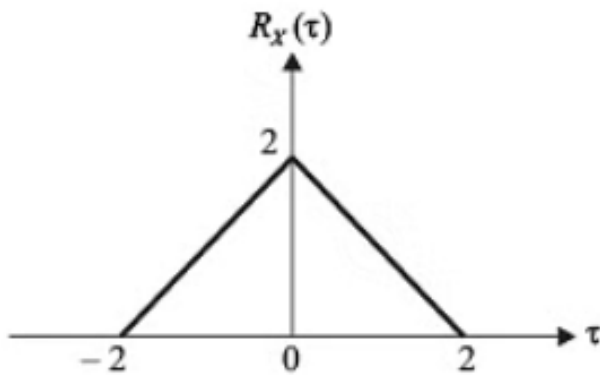
GATE 2021 EC

EE:1205 Signals and systems
Indian Institute of Technology, Hyderabad

Sai Preetam Umesh Sasankota
EE23BTECH11221

Question 47:

The autocorrelation function $R_x(\tau)$ of a wide-sense stationary random process $X(t)$ is shown in the figure. The average power of $X(t)$ is ?



Autocorrelation function of $X(t)$ is defined as:

$$R_x(\tau) = E[X(t)X(t+\tau)] \quad (3)$$

$$R_x(0) = E[X(t)X(t+0)] \quad (4)$$

$$= E[X(t)X(t)] \quad (5)$$

From equations (1) and (3)

$$P_x = R_x(0) \quad (6)$$

$$\Rightarrow P_x = 2W \quad (7)$$

Solution: Here $R_x(0) = 2$ Average power of $X(t)$

Parameter	Description
$R_x(\tau)$	Autocorrelation function
$X(t)$	Stationary random process
P_x	Average power

TABLE 0
VALUES

is given as mean square value of $X(t)$, i.e.,

$$P_x = E[X^2(t)] \quad (1)$$

$$= E[X(t)X(t)] \quad (2)$$

Defination: Autocorrelation factor is the factor we use to correlate the average phase of a wave, in this case $X(t)$.