

ASSIGNMENT-10

AI1110

MUKUNDA REDDY
AI21BTECH11021

Outline

1 Question

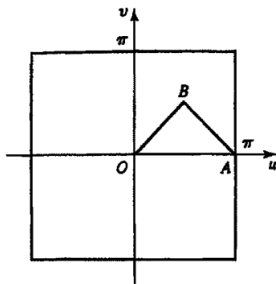
2 Solution

Exercise 10-29

Show that the function

$$S(u, v) = H(e^{ju})H(e^{jv})H(e^{-j(u+v)})$$

is determined in terms of its values in the triangle of this figure.



Solution

We already know that

$$S_a(u, v) = H_a(u)H_a(v)H_a(-ju - jv) \quad (1)$$

In this case clearly $S_a(u, v) = S(u, v)$ for $|u|, |v|, |u + v| < \pi$ and 0 otherwise. The function $S_a(u, v)$ is a bispectrum of a bandlimited process, $x(t)$ with $\sigma = \pi$;

Solution

hence it is determined from its values in the triangle of the figure. We already know that

$$S_{yyy}(u, v) = QH(u)H(v)H^*(u + v) \quad (2)$$

$$S_{yyy}(u, v) = B(u, v)e^{j\theta(u, v)} \quad (3)$$

the value of $H_a(w)$ is obtained from these equations. solving we get

$$\text{Where } H_a(w) = \begin{cases} H(e^{jw}) & , |w| \leq \pi \\ 0 & , \text{otherwise} \end{cases}$$

Solution

Substituting the value $H_a(w)$ in 1 we get required equation which we are interested to show that is

$$S(u, v) = H(e^{ju})H(e^{jv})H(e^{-j(u+v)})$$