

ECE 732 Homework 6

1. Show that the Periodogram and the Correlogram are equivalent.
2. Find the “half-power” width of the main lobe of a window function $W(f)$. The half-power cut-off frequency is the value of f satisfying

$$W(f) = \frac{W(0)}{2}$$

Assume that the window function has a peak at $f = 0$ and is symmetric about that point. Furthermore, assume that the peak of $W(f)$ is sufficiently narrow (as it should be). Using a Taylor series expansion, show that the bandwidth (half-power width) of the main lobe is approximately

$$B \approx 2\sqrt{\frac{W(0)}{|W''(0)|}}$$