Statistics 248 - Homework 6 (D. R. Brillinger)

Consider the image

$$Y(x,y) = \rho\cos(\lambda x + \mu y + \delta)$$

$0 < x < X$, $0 < y < Y$. Suppose that it is possible to envisage $X, Y \to \infty$.

Evaluate

$$\lim_{X,Y\to\infty} \frac{1}{X}\frac{1}{Y}\int_0^X \int_0^Y Y(x,y)dxdy$$

and

$$\lim_{X,Y\to\infty} \frac{1}{X}\frac{1}{Y}\int_0^X \int_0^Y Y(x+u,y+v)Y(x,y)dxdy$$

Distinguish the cases $\lambda^2 + \mu^2 = 0$ and $\neq 0$.