Fresnel Zones on the Screen

Pierre Goetgheluck

Abstract

For λ real, we consider the pattern given by the value modulo 2 of the integer part of $\lambda(x^2+y^2)$, where $(x,y) \in \mathbb{Z} \times \mathbb{Z}$. We study the periodicity and other geometric properties of this pattern, and show that it can provide, by visual inspection and an elementary computation, a diophantine approximation for λ. We conclude with similar results for other moduli.