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The Average Number of Real Zeros of a Random Trigonometric Polynomial

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Abstract

In this paper we estimate the average number of real zeros of a class of trigonometric polynomials of the form

$$T(\theta) = \sum_{k=1}^{n} a_k \, b_k \, \cos(k\theta),$$

where the a_k's are independent standard normally distributed random variables and the b_k's are binomial coefficients $\left(\begin{array}{c} n \\ k \end{array} \right)^{\frac{1}{2}}$.