

On the Distribution of Real Roots in Quadratic and Cubic Random Polynomials: A Theoretical Numerical Review

Irene Sarahi Del Real Vargas, Maria Esther Grimaldo Reyna, Francisco Javier Almaguer Martinez

Autonomous University of Nuevo Leon
irene.r.vargas@hotmail.com, megr_maac@yahoo.com.mx,
francisco.almaguermrt@uanl.edu.mx

Abstract

The problem of determining the distribution of the roots of random polynomials, where the coefficients of these polynomials are random variables with some distribution, is an interesting topic that has been commonly studied from a theoretical view. However, it can also be addressed with numerical tools. In this work, a theoretical numerical review of the probability distribution in the zeros of quadratic and cubic random polynomials is presented. The coefficients of the polynomials are independent real uniform random variables. For the quadratic polynomial two cases are considered; first, the quadratic coefficient has the value one and in the second, the quadratic coefficient is an uniform random variable. Numerical tests were performed and the results are consistent with the probability distributions found analytically and, in general, with the known results of the random polynomials theory. For the cubic polynomial, their coefficients are independent real uniform random variables, the results of the numerical tests are analyzed and contrasted with the fact that the real roots preferably are accumulate around plus minus one.

References

1. C. P. HUGHES AND A. NIKEGBALI. The Zeros Of Random Polynomials Cluster Uniformly Near The Unit Circle. *Compositio Math.* 144 (2008) 734–746.