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Kernel Asymptotics for the Mahler Ensemble of Real Polynomials

The Mahler measure of a polynomial is the absolute value of the lead coefficient times the product of the absolute values of the roots outside the unit circle. The set of degree N polynomials with Mahler measure at most 1 forms a bounded subset of \mathbb{R}^{N+1} . The roots of polynomials chosen uniformly from this region yields a Pfaffian point process on the complex plane similar to that of Ginibre's real ensemble but with a different (sub-exponential) weight. The limiting density of roots is uniform measure on the unit circle, and we discuss the scaling limits for the matrix kernel in a neighborhood of a point on the unit circle. New phenomena appear in a neighborhood of 1, since the spectrum consists of both real roots and complex conjugate pairs. Relationships with the related determinantal ensemble (of roots of complex polynomials) will be discussed as well as an electrostatic and matrix model for the ensemble.