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Dynamics of the Support of the Equilibrium Measure in a Quartic Field

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Abstract. The asymptotic analysis of orthogonal polynomials with respect to a varying weight has found many interesting applications in approximation theory, random matrix theory and other areas. It has also stimulated a further development of the logarithmic potential theory, since the equilibrium measure in an external field associated with these weights enters the leading term of the asymptotics and its support is typically the place where zeros accumulate and oscillations occur.

In a rather broad class of problems, the varying weight on the real line is given by powers of a function of the form $\exp(P(x))$, where P is a polynomial. For P of degree 2, the associated orthogonal polynomials can be expressed in terms of (varying) Hermite polynomials. Surprisingly, the next case, when P is of degree 4, is not fully understood. We study the equilibrium measure in the external field generated by such a weight, discussing especially the possible transitions between different configurations of its support.

This is a joint work with E.A. Rakhmanov and R. Orive.