Spectral Transforms of Measures and Orthogonal Polynomials on Regions

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We consider monic polynomials $\Phi_n(z)$ that are orthogonal with respect to a measure μ supported on the closed interior of an analytic Jordan curve L. Let $\varphi(z)$ be the canonical conformal map of the exterior of L onto the exterior of the unit circle, and let C be the logarithmic capacity of L, which is given by $C = 1/\varphi'(\infty)$. We give necessary conditions for the measure μ to have the property that the Szegő-type asymptotic formula

$$\lim_{n\to\infty} \frac{\Phi_n(z)}{C^n \varphi(z)^n} = D(z)$$

holds true on some simply connected neighborhood of ∞ containing the curve L. We also prove that such a property is preserved when μ is perturbed by multiplication by a rational weight and the addition of finitely many point masses. This is a joint work with Brian Simanek, Vanderbilt University.