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8. Analysis

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Applications of weighted Hele-Shaw flow and kernel function techniques to Green functions for weighted biharmonic operators

Let ω be a positive, logarithmically subharmonic function in the unit disk which satisfies

$$h(0) = \int_{\mathbb{D}} h(z)\omega(z)\, dS(z) \tag{1}$$

for all bounded harmonic functions h in $\mathbb{D}$. Consider an increasing family of domains Ω_t, $0 < t \leq 1$, ($\Omega_1 = \mathbb{D}$) such that (1) holds for Ω_t except for an extra factor of t on the left hand side. We show how this flow is related to the Green function for the operator $\Delta \frac{1}{\omega} \Delta$ in $\mathbb{D}$. Together with some new result on analytic kernel functions for weighted Bergman spaces it follows that all Green functions of the type considered above are positive. The result has applications for factorization in Bergman spaces. This is a joint work with H. Hedenmalm and S. M. Shimorin.