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The Analytic Fixed Point Function in the Disk

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Abstract. Let φ be analytic in the unit disk \mathbb{D} and let $\varphi(\mathbb{D}) \subset \mathbb{D}$, $\varphi(0) \neq 0$. Then $w = z/\varphi(z)$ has an analytic inverse $z = f(w)$, $w \in \mathbb{D}$, the fixed point function. Here $f(\mathbb{D})$ is a starlike domain and various results suggest that $f(\mathbb{D})$ might even be hyperbolically convex. We study the derivative and the coefficients of f , in particular their asymptotic behaviour. In the case that φ is the generating function of a random variable, several functions related to f have probabilistic interpretations.

Keywords. Fixed point function, hyperbolically convex, coefficients, asymptotic behaviour, probability generating function, large deviations, branching process.

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