

İSTANBUL ANALYSIS SEMINARS

DISTORTION PROPERTIES OF PERTURBED m -VALENT JANOWSKI STARLIKE LOG-HARMONIC FUNCTIONS

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Abstract: Let $H(\mathbb{D})$ be the linear space of all analytic functions defined on the open unit disc $\mathbb{D} = \{z \mid |z| < 1\}$. A sense-preserving log-harmonic mapping is a solution of the non-linear elliptic partial differential equation

$$\overline{f_z} = w \frac{\overline{f}}{f} f_z,$$

where $w(z)$ is the second dilatation of f such that $|w(z)| < 1$ for all $z \in \mathbb{D}$. It has been shown that if f is a non-vanishing log-harmonic mapping, then f can be expressed as

$$f(z) = h(z)\overline{g(z)},$$

where $h(z)$ and $g(z)$ are analytic in \mathbb{D} . If f vanishes at $z = 0$ but is not identically zero, then f admits the representation

$$f(z) = z|z|^{2\beta} h(z)\overline{g(z)},$$

where $\operatorname{Re} \beta > -\frac{1}{2}$, and $h(z)$ and $g(z)$ are analytic in D with $g(0) = 1$ and $h(0) \neq 0$. Let $f = z^m |z|^{2m\beta} h(z)\overline{g(z)}$ be a univalent log-harmonic mapping, where m is a positive integer. We say that f is a Janowski starlike log-harmonic mapping if

$$\operatorname{Re} \left(\frac{zf_z - \overline{z}f_{\overline{z}}}{f} \right) > \frac{1-A}{1-B}.$$

The class of all Janowski starlike log-harmonic mappings is denoted by $\mathcal{S}_{LH}^*(A, B)$. We also note that if $z^m h(z)$ is an m -valent starlike function, then the Janowski starlike log-harmonic mapping $f = z^m |z|^{2m\beta} h(z)\overline{g(z)}$ will be called a perturbed m -valent Janowski starlike log-harmonic mapping, and the family of such functions will be denoted by $\mathcal{S}_{PLH_m}^*(A, B)$. The aim of the talk is to investigate the distortion properties of perturbed m -valent starlike log-harmonic mappings.

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