The Radius of Starlikeness of the p-Valent λ-Fractional Operator

Yaşar Polatoğlu

TC İstanbul Kültür University

Abstract

Let $\mathcal{A}_p$ denote the class of functions of the form $f(z) = z^p + a_{p+1}z^{p+1} + \cdots + a_{p+n}z^{p+n} + \cdots$ which are analytic in the open unit disc $\mathbb{D} = \{z \in \mathbb{C} || z| < 1\}$. A function $f(z) \in \mathcal{A}_p$ is said to be p-valently starlike in $\mathbb{D}$ if there exists a positive real number ρ such that for $\rho < |z| < 1$, $\mathrm{Re}\left(z\frac{f'(z)}{f(z)}\right) > 0$, and $\int_0^{2\pi} \mathrm{Re}\left(z\frac{f'(z)}{f(z)}\right) d\theta = 2\pi p$, $z = re^{i\theta}$, $\rho < r < 1$. We shall denote by $\mathcal{S}^*(p)$ the class of functions $f(z)$ in $\mathcal{A}_p$ which are regular and p-valently starlike in $\mathbb{D}$.

The aim of this talk is to give the sharp radius of starlikeness for the λ-fractional operator

$$\mathrm{D}^\lambda f(z) = \frac{\Gamma(p+1-\lambda)}{\Gamma(p+1)} z^\lambda \mathrm{D}_z^\lambda f(z),$$

where $\mathrm{D}^\lambda f(z)$ is the fractional derivative of $f(z)$.