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Properties of multivalent functions associated with the integral operator defined by the hypergeometric function

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Abstract

In this paper, we introduce a new class of multivalent functions by using a generalized integral operator defined by the hypergeometric function. Some properties such as inclusion, radius problem and integral preserving are considered.

MSC: 30C45; 30C50

Keywords: Bazilevic functions; multivalent functions; integral operator; hypergeometric functions

1 Introduction and preliminaries

Let A_p denote the class of functions $f(z)$ of the form

$$f(z) = z^p + \sum_{n=p+1}^{\infty} a_n z^n \quad (p \in \mathbb{N} = \{1, 2, 3, \dots\}), \quad (1.1)$$

which are analytic in the open unit disc E . Also $A_1 = A$, the usual class of analytic functions defined in the open unit disc $E = \{z : |z| < 1\}$. A function $f \in A_p$ is a p -valent starlike function of order ρ if and only if

$$\operatorname{Re} \frac{zf'(z)}{f(z)} > \rho, \quad 0 \leq \rho < p, z \in E.$$

This class of functions is denoted by $S_p^*(\rho)$. It is noted that $S_p^*(0) = S_p^*$. Let $f(z)$ and $g(z)$ be analytic in E , we say $f(z)$ is subordinate to $g(z)$, written $f \prec g$ or $f(z) \prec g(z)$ if there exists a Schwarz function $w(z)$, $w(0) = 0$ and $|w(z)| < 1$ in E , then $f(z) = g(w(z))$. In particular, if g is univalent in E , then we have the following equivalence

$$f(z) \prec g(z) \iff f(0) = g(0) \text{ and } f(E) \subset g(E).$$

For any two analytic functions $f(z)$ and $g(z)$ with

$$f(z) = \sum_{n=0}^{\infty} b_n z^{n+1} \quad \text{and} \quad g(z) = \sum_{n=0}^{\infty} c_n z^{n+1}, \quad z \in E,$$

Multivalent Functions

Shigeo Ozaki



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