DIFFERENTIAL SANDWICH THEOREMS FOR HIGHER-ORDER DERIVATIVES OF p-VALENT FUNCTIONS INVOLVING A GENERALIZED DIFFERENTIAL OPERATOR

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In the present article, we obtain some applications of first order differential subordination, superordination and sandwich results for higher-order derivatives of p-valent functions involving a generalized differential operator. Some of our results improve and generalize previously known results.

1. Introduction

Let $H(U)$ be the class of analytic functions in the open unit disk $U = \{z \in \mathbb{C} : |z| < 1\}$ and let $H[a, p]$ be the subclass of $H(U)$ consisting of functions of the form:

$$f(z) = a + a_p z^p + a_{p+1} z^{p+1} \ldots \quad (a \in \mathbb{C}; \ p \in \mathbb{N} = \{1, 2, \ldots\}).$$

For simplicity $H[a] = H[a, 1]$. Also, let $\mathcal{A}(p)$ be the subclass of $H(U)$ consisting of functions of the form:

$$f(z) = z^p + \sum_{k=p+1}^{\infty} a_k z^k \quad (p \in \mathbb{N}), \tag{1}$$