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On A Certain Subclass of Analytic Functions Defined Via a Generalized Differential Operator

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ABSTRACT

In this paper we introduce and study several new subclasses of analytic and univalent functions in the open unit disk defined by means of a generalized differential operator. The operator generalizes numerous differential operators which have been widely used in geometric function theory. Using standard techniques involving subordination and Carath'eodory functions, we derive comprehensive coefficient estimates, the Fekete–Szegő inequality, bounds for the second Hankel determinant, inclusion relationships, neighborhood properties, Growth and Distortion properties. The results obtained in this work generalize and unify several earlier results in the literature.

Keywords: Analytic functions, differential operator, unit disk, coefficient estimates, Fekete–Szegő inequality, Hankel determinant.

INTRODUCTION

Let $\mathcal{A}$ denote the class of analytic functions of the form

$$f(z) = z + \sum_{n=2}^{\infty} a_n z^n \tag{1}$$

which are analytic in the open unit disk

$$U = \{z \in \mathbb{C}: |z| < 1\}.$$

The study of subclasses of analytic and univalent functions defined via differential operators has been an active area of research in geometric function theory ([4],[5],[8]). Many well–known subclasses such as starlike, convex, and close–to–convex functions have been characterized using differential operators.

Recently, several authors have introduced differential operators to generate new families of analytic functions and study their geometric properties. These operators often lead to interesting results involving coefficient bounds, distortion theorems, neighborhood problems, and Hankel determinants.

Motivated by these developments, we consider a generalized differential operator which extends several known operators. Using this operator, we introduce a new subclass of analytic functions defined through a real part condition.

For functions belonging to this class, we derive coefficient estimates, neighborhood properties, inclusion relations, growth and distortion bounds, the Fekete–Szegő inequality, and bounds for the second Hankel determinant.

Preliminaries And Definitions

In this section we introduce the generalized differential operator and define the subclass of analytic functions that will be studied throughout this paper.

Definition 1. (See [7]) Let $f \in \mathcal{A}$ be given by (1).

The generalized differential operator $D^m_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t)f(z)$ is defined by

$$D^0_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t)f(z) = f(z) \qquad (2)$$

$$D^1_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t)f(z) = \left(\frac{(\mu+\lambda)[l+(1+(n+\eta-\delta-1)t)]-(\beta-\sigma)(\lambda-\alpha)}{\mu+\lambda}\right)f(z)$$

$$+\left(\frac{(\beta-\sigma)(\lambda-\alpha)}{\mu+\lambda}\right)zf'(z) \qquad (3)$$

$$D^m_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t)f(z) = D_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t)\left(D^{m-1}_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t)\right)f(z) \qquad (4)$$

for $l,\alpha,\sigma,t \geq 0, \quad \beta,\lambda,\mu > 0, \quad \lambda \neq \alpha, \quad 0 \leq \eta \leq \delta, \quad m \in N_0$

If $f(z) = z + \sum_{n=2}^{\infty} a_n z^n$, then from (4),

$$D^m_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t)f(z) = z + \sum_{n=2}^{\infty} \Omega_n a_n z^n, \qquad (5)$$

were

$$\Omega_n = \left(\frac{(\mu+\lambda)[l+(1+(n+\eta-\delta-1)t)]+(n-1)(\beta-\sigma)(\lambda-\alpha)}{\mu+\lambda}\right)^m . \qquad (6)$$

Remark 1: This operator generalizes several classical differential operators used in geometric function theory as seen below:

(i) when $l,\ t = 0$, $D^m_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t)f(z)$ was developed by Amoural and Yussef [2].

(ii) When $\mu = 1-\lambda,\ \beta = \sigma = 1,\ l = 0$; $D^m_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t)f(z)$ is the Opoola differential operator [6].

(iii) When $t = 0,\ l = 1,\ \mu = 1-\lambda,\ D^m_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t)f(z) = D^m_{1-\lambda,\lambda,\sigma}(\alpha,\beta) = z + \sum_{n=2}^{\infty}[1+(n-1)(\lambda-\alpha)(\beta-\sigma)]^m a_n z^n$ is introduced and studied by Ramadan and Darus [9].

(iv) When $t = o,\ l = 1,\ \mu = 1-\lambda,\ \sigma = 0,\ D^m_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t)f(z) \equiv D^m_{1-\lambda,\lambda,0}(\alpha,\beta)f(z) = z + \sum_{n=2}^{\infty}[1+(n-1)(\lambda-\alpha)\beta -]^m a_n z^n$ which was investigated and exploited by Darus and Ibrahim [3].

(v) When $t = 0,\ l = 1,\ \sigma = \alpha = 0,\ \beta = 1,\ D^m_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t)f(z) \equiv D^m_{\mu,\lambda,0}(0,\ 1)f(z) = z + \sum_{n=2}^{\infty}\left(\frac{\mu+\lambda n}{\mu+\lambda}\right)^m a_n z^n$ was introduced by Swamy [11].

(vi) When $t = \sigma = \alpha = 0,\ l = 1,\ \mu = 1-\lambda,\ \beta = 1,\ D^m_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t)f(z) \equiv D^m_{1-\lambda,\lambda,0}(0,\ 1)f(z) = z + \sum_{n=2}^{\infty}[1+(n-1)\lambda]^m a_n z^n$ which Al-Oboudi studied [1].

(vii) When $\mu = 1-\lambda,\ \lambda = \beta = 1,\ \alpha = \sigma = l = 0,\ D^m_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t)f(z) \equiv D^m_{1-\lambda,1,0}(0,\ 1)f(z) = z + \sum_{n=2}^{\infty} n^m a_n z^n$ which was studied by Sălăgean [10].

(viii) When $l = t = 0, \quad \beta = \sigma = 1, \quad D^m_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t)f(z) = f(z)$.

Using this generalized differential operator, we now introduce a new subclass of analytic functions as follows:

Definition 2. A function $f \in \mathcal{A}$ is said to belong to the class

$$S^{m}_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t,\xi)$$

if it satisfies the condition

$$\Re\left\{\frac{D^{m}_{\mu,\lambda,\sigma}f(z)}{z}\right\} > \xi, \qquad 0 \le \xi < 1, \quad z \in U.$$

Definition 3. For a function

$$f(z) = z + \sum_{n=2}^{\infty} a_n z^n$$

the δ–neighbourhood of f is defined by

$$N_{\delta}(f) = \left\{g(z) = z + \sum_{n=2}^{\infty} b_n z^n \colon \sum_{n=2}^{\infty} n\,|a_n - b_n| \le \delta\right\}.$$

Lemma 1. If $p(z)$ is analytic in U and satisfies

$$p(z) = 1 + \sum_{n=1}^{\infty} c_n z^n$$

with

$$\Re\{p(z)\} > 0,$$

then

$$|c_n| \le 2$$

for all $n \ge 1$.

This lemma plays a crucial role in obtaining coefficient bounds and other related estimates.

RESULTS AND DISCUSSION

Theorem 1 (Coefficient Estimates).

If $f \in S^{m}_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t,\xi)$ then

$$|a_n| \le \frac{2(1-\xi)}{\Omega_n}, \quad n \ge 2. \tag{7}$$

Proof. Suppose that $f \in S^{m}_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t,\xi)$. Then by definition

$$\Re\left\{\frac{D^{m}_{\mu,\lambda,\sigma}f(z)}{z}\right\} > \xi. \tag{8}$$

This implies that there exists an analytic function $p(z)$ such that

$$\frac{D^m_{\mu,\lambda,\sigma}f(z)}{z}=\xi+(1-\xi)p(z) \tag{9}$$

where $p(z)$ satisfies $\Re\big(p(z)\big)>0$ and

$$p(z)=1+\sum_{n=1}^{\infty}c_n\,z^n. \tag{10}$$

Hence, the right-hand side of (9) becomes

$$\xi+(1-\xi)p(z)=1+\sum_{n=1}^{\infty}(1-\xi)\,c_n z^n. \tag{11}$$

Now from (5),

$$D^m_{\mu,\lambda,\sigma}f(z)=z+\sum_{n=2}^{\infty}\Omega_n\,a_n z^n. \tag{12}$$

which implies that

$$\frac{D^m_{\mu,\lambda,\sigma}f(z)}{z}=1+\sum_{n=2}^{\infty}\Omega_n\,a_n z^{n-1}. \tag{13}$$

Comparing (13) with (11), we obtain

$$\Omega_n a_n=(1-\xi)c_{n-1}. \tag{14}$$

Thus

$$a_n=\frac{(1-\xi)c_{n-1}}{\Omega_n}. \tag{15}$$

Using the bound $|c_{n-1}|\le 2$ from Lemma 1 we obtain

$$|a_n|\le\frac{2(1-\xi)}{\Omega_n}. \tag{16}$$

This completes the proof.

If $m=1$, $t=0$, $l=1$, $\sigma=\alpha=0$, and $\beta=1$, then Theorem 1 reduces to:

Corollary 1: If $f\in S^1_{\mu,\lambda,0}(0,1,\delta,\eta,1,0,\xi)$ then

$$|\,a_n\,|\le\frac{2(1-\xi)}{\left(\frac{\mu+\lambda n}{\mu+\lambda}\right)}$$

Theorem 2 (Fekete–Szegö Inequality). Let $f\in S^m_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t,\xi)$. Then for any real number ν

$$|a_3-\nu a_2^2|\le\frac{2(1-\xi)}{\Omega_3}+|\nu|\frac{4(1-\xi)^2}{\Omega_2^2}. \tag{17}$$

Proof. From (15), we have

$$a_2 = \frac{(1-\xi)c_1}{\Omega_2} \tag{18}$$

and

$$a_3 = \frac{(1-\xi)c_2}{\Omega_3}. \tag{19}$$

Therefore

$$a_3 - \nu a_2^2 = \frac{(1-\xi)c_2}{\Omega_3} - \nu\left(\frac{(1-\xi)c_1}{\Omega_2}\right)^2. \tag{20}$$

Taking modulus, we obtain

$$|a_3 - \nu a_2^2| \le \frac{(1-\xi)|c_2|}{\Omega_3} + |\nu|\frac{(1-\xi)^2|c_1|^2}{\Omega_2^2}. \tag{21}$$

Using the bound $|c_n| \le 2$ from Lemma 1 we obtain

$$|a_3 - \nu a_2^2| \le \frac{2(1-\xi)}{\Omega_3} + |\nu|\frac{4(1-\xi)^2}{\Omega_2^2}.$$

This completes the proof.

Next, we consider the second Hankel determinant defined by

$$H_2(2) = a_2a_4 - a_3^2. \tag{22}$$

Theorem 3 (Second Hankel Determinant). If $f \in S_{\mu,\lambda,\sigma}^m(\alpha,\beta,\delta,\eta,l,t,\xi)$ then

$$|a_2a_4 - a_3^2| \le \frac{4(1-\xi)^2}{\Omega_2\Omega_4} + \frac{4(1-\xi)^2}{\Omega_3^2}. \tag{23}$$

Proof. Using the coefficient relations

$$\Omega_n a_n = (1-\xi)c_{n-1} \tag{24}$$

we obtain

$$a_2 = \frac{(1-\xi)c_1}{\Omega_2}, \quad a_3 = \frac{(1-\xi)c_2}{\Omega_3}, \quad a_4 = \frac{(1-\xi)c_3}{\Omega_4}. \tag{25}$$

Hence

$$a_2a_4 - a_3^2 = \frac{(1-\xi)^2c_1c_3}{\Omega_2\Omega_4} - \frac{(1-\xi)^2c_2^2}{\Omega_3^2}. \tag{26}$$

Taking modulus gives

$$|a_2a_4 - a_3^2| \le \frac{(1-\xi)^2|c_1||c_3|}{\Omega_2\Omega_4} + \frac{(1-\xi)^2|c_2|^2}{\Omega_3^2}. \tag{27}$$

Using $|c_n| \le 2$ we obtain

$$|a_2 a_4 - a_3^2| \le \frac{4(1-\xi)^2}{\Omega_2 \Omega_4} + \frac{4(1-\xi)^2}{\Omega_3^2}. \tag{28}$$

This completes the proof.

The obtained coefficient bounds depend explicitly on the sequence Ω_n, which is determined by the parameters of the generalized operator. Consequently, different choices of the parameters produce families of analytic functions with distinct geometric behaviours. The results therefore provide a unified framework for deriving coefficient estimates for several known operator-generated classes.

In particular, when the parameters are chosen so that the operator reduces to classical operators such as the Sălăgean or Al-Oboudi operators, the obtained bounds immediately reduce to previously known results. Thus, the present results extend and generalize many earlier findings in geometric function theory.

Theorem 4 (Inclusion Relations). If $0 \le \xi_1 < \xi_2 < 1$ then

$$S_{\mu,\lambda,\sigma}^{m}(\alpha,\beta,\delta,\eta,l,t,\xi_2) \subset S_{\mu,\lambda,\sigma}^{m}(\alpha,\beta,\delta,\eta,l,t,\xi_1). \tag{29}$$

Proof. Let $f \in S_{\mu,\lambda,\sigma}^{m}(\alpha,\beta,\delta,\eta,l,t,\xi_2)$. Then

$$\Re\left\{\frac{D^m f(z)}{z}\right\} > \xi_2. \tag{30}$$

Since $\xi_1 < \xi_2$, it follows that

$$\Re\left\{\frac{D^m f(z)}{z}\right\} > \xi_1. \tag{31}$$

Hence $f \in S_{\mu,\lambda,\sigma}^{m}(\alpha,\beta,\delta,\eta,l,t,\xi_1)$ which proves

$$S_{\mu,\lambda,\sigma}^{m}(\alpha,\beta,\delta,\eta,l,t,\xi_2) \subset S_{\mu,\lambda,\sigma}^{m}(\alpha,\beta,\delta,\eta,l,t,\xi_1).$$

Theorem 5 (Neighborhood Theorem). If $f \in S_{\mu,\lambda,\sigma}^{m}(\alpha,\beta,\delta,\eta,l,t,\xi)$ then

$$N_\delta(f) \subset S_{\mu,\lambda,\sigma}^{m}(\alpha,\beta,\delta,\eta,l,t,\xi)$$

whenever

$$\delta \le \frac{1-\xi}{\Omega_2}.$$

Proof. Since

$$f \in S_{\mu,\lambda,\sigma}^{m}(\alpha,\beta,\delta,\eta,l,t,\xi)$$

we have

$$\Re\left\{\frac{D_{\mu,\lambda,\sigma}^{m} f(z)}{z}\right\} > \xi.$$

From (13), we have

$$\frac{D^m_{\mu,\lambda,\sigma} f(z)}{z} = 1 + \sum_{n=2}^{\infty} \Omega_n \, a_n z^{n-1}.$$

Similarly,

$$D^m_{\mu,\lambda,\sigma} g(z) = z + \sum_{n=2}^{\infty} \Omega_n \, b_n z^n$$

so that

$$\frac{D^m_{\mu,\lambda,\sigma} g(z)}{z} = 1 + \sum_{n=2}^{\infty} \Omega_n \, b_n z^{n-1}.$$

Consider

$$\frac{D^m_{\mu,\lambda,\sigma} g(z)}{z} - \frac{D^m_{\mu,\lambda,\sigma} f(z)}{z} = \sum_{n=2}^{\infty} \Omega_n \, (b_n - a_n) z^{n-1},$$

hence

$$\left| \frac{D^m_{\mu,\lambda,\sigma} g(z)}{z} - \frac{D^m_{\mu,\lambda,\sigma} f(z)}{z} \right| \leq \sum_{n=2}^{\infty} \Omega_n \, |b_n - a_n|. \qquad (32)$$

From definition 3,

$$\sum_{n=2}^{\infty} n \, |a_n - b_n| \leq \delta.$$

Thus

$$|a_n - b_n| \leq \frac{\delta}{n}$$

so that (32) becomes

$$\left| \frac{D^m_{\mu,\lambda,\sigma} g(z)}{z} - \frac{D^m_{\mu,\lambda,\sigma} f(z)}{z} \right| \leq \sum_{n=2}^{\infty} \Omega_n \frac{\delta}{n}.$$

Since Ω_n is increasing in n

$$\Omega_n \geq \Omega_2.$$

Thus

$$\left| \frac{D^m_{\mu,\lambda,\sigma} g(z)}{z} - \frac{D^m_{\mu,\lambda,\sigma} f(z)}{z} \right| \leq \Omega_2 \sum_{n=2}^{\infty} \frac{\delta}{n}.$$

For analytic functions in the unit disk, the dominant term occurs at $n = 2$, giving

$$\left|\frac{D^m_{\mu,\lambda,\sigma}g(z)}{z}-\frac{D^m_{\mu,\lambda,\sigma}f(z)}{z}\right|\le \Omega_2\delta.$$

Applying triangle inequality, we have

$$\Re\left\{\frac{D^m_{\mu,\lambda,\sigma}g(z)}{z}\right\}\ge \Re\left\{\frac{D^m_{\mu,\lambda,\sigma}f(z)}{z}\right\}-\left|\frac{D^m_{\mu,\lambda,\sigma}g(z)}{z}-\frac{D^m_{\mu,\lambda,\sigma}f(z)}{z}\right|$$

and using

$$\Re\left\{\frac{D^m_{\mu,\lambda,\sigma}f(z)}{z}\right\}>\xi$$

we have

$$\Re\left\{\frac{D^m_{\mu,\lambda,\sigma}g(z)}{z}\right\}>\xi-\Omega_2\delta.$$

For g to belong to the same class we require

$$\xi-\Omega_2\delta\ge\xi-(1-\xi).$$

Thus

$$\Omega_2\delta\le 1-\xi$$

Therefore,

$$\delta\le\frac{1-\xi}{\Omega_2}.$$

Hence,

$$g\in S^m_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t,\xi)$$

Theorem 6 (Growth Theorem). If $f\in S^m_{\mu,\lambda,\sigma}(\alpha,\beta,\delta,\eta,l,t,\xi)$ and $|z|=r<1$, then

$$r-\sum_{n=2}^{\infty}\frac{2(1-\xi)}{\Omega_n}r^n\le|f(z)|\le r+\sum_{n=2}^{\infty}\frac{2(1-\xi)}{\Omega_n}r^n$$

Proof. From (1),

$$f(z)=z+\sum_{n=2}^{\infty}a_n\,z^n$$

For $|z|=r$,

$$|f(z)|=\left|z+\sum_{n=2}^{\infty}a_n\,z^n\right|.$$

Using the triangle inequality, we have

$$|f(z)| \leq |z| + \sum_{n=2}^{\infty} |a_n| \, |z|^n.$$

Thus

$$|f(z)| \leq r + \sum_{n=2}^{\infty} |a_n| \, r^n.$$

From Theorem 1,

$$|a_n| \leq \frac{2(1-\xi)}{\Omega_n},$$

hence,

$$|f(z)| \leq r + \sum_{n=2}^{\infty} \frac{2(1-\xi)}{\Omega_n} r^n.$$

which gives the upper bound.

Using the reverse triangle inequality

$$|A + B| \geq |A| - |B|,$$

we have

$$|f(z)| \geq |z| - \left| \sum_{n=2}^{\infty} a_n \, z^n \right|.$$

Thus

$$|f(z)| \geq r - \sum_{n=2}^{\infty} |a_n| \, r^n,$$

$$|f(z)| \geq r - \sum_{n=2}^{\infty} \frac{2(1-\xi)}{\Omega_n} r^n.$$

Therefore

$$r - \sum_{n=2}^{\infty} \frac{2(1-\xi)}{\Omega_n} r^n \leq |f(z)| \leq r + \sum_{n=2}^{\infty} \frac{2(1-\xi)}{\Omega_n} r^n$$

Theorem 7 (Distortion Theorem). If $f \in S_{\mu,\lambda,\sigma}^{m}(\alpha, \beta, \delta, \eta, l, t, \xi)$ and $|z| = r < 1$, then

$$1 - \sum_{n=2}^{\infty} \frac{2n(1-\xi)}{\Omega_n} r^{n-1} \leq |f(z)| \leq 1 + \sum_{n=2}^{\infty} \frac{2n(1-\xi)}{\Omega_n} r^{n-1}$$

Proof. From (1),

$$\mathrm{f(z) = z + \sum_{n=2}^{\infty} a_n\, z^n,}$$

then

$$\mathrm{f'(z) = 1 + \sum_{n=2}^{\infty} n\, a_n z^{n-1}.}$$

For $|\mathrm{z}| = \mathrm{r}$,

$$\mathrm{|f'(z)| = \left|1 + \sum_{n=2}^{\infty} n\, a_n z^{n-1}\right|.}$$

Using the triangle inequality, we have

$$\mathrm{|f'(z)| \le 1 + \sum_{n=2}^{\infty} n\, |a_n| r^{n-1}.}$$

From Theorem 1,

$$\mathrm{|a_n| \le \frac{2(1-\xi)}{\Omega_n},}$$

hence,

$$\mathrm{|f'(z)| \le 1 + \sum_{n=2}^{\infty} \frac{2n(1-\xi)}{\Omega_n} r^{n-1}.}$$

which gives the upper bound.

Using the reverse triangle inequality

$$\mathrm{|A + B| \ge |A| - |B|,}$$

we have

$$\mathrm{|f'(z)| \ge 1 - \sum_{n=2}^{\infty} n\, |a_n| r^{n-1}.}$$

$$\mathrm{|f'(z)| \ge 1 - \sum_{n=2}^{\infty} \frac{2n(1-\xi)}{\Omega_n} r^{n-1}.}$$

Therefore

$$\mathrm{1 - \sum_{n=2}^{\infty} \frac{2n(1-\xi)}{\Omega_n} r^{n-1} \le |f(z)| \le 1 + \sum_{n=2}^{\infty} \frac{2n(1-\xi)}{\Omega_n} r^{n-1}}$$

CONCLUSION

In this paper we introduced a subclass of analytic functions defined via a generalized differential operator and investigated several of its geometric properties. Using standard techniques involving functions with positive real part, we derived coefficient estimates, Fekete–Szegő inequalities, bounds for the second Hankel determinant, neighborhood results, inclusion relations, and growth and distortion properties.

The generalized operator considered in this work encompasses several well-known operators in geometric function theory as special cases, including the Sălăgean operator, the Al-Oboudi operator, and other multiplier differential operators. Consequently, the results obtained here unify and extend numerous earlier results reported in Definition 1.

The approach adopted in this paper provides a flexible framework for studying analytic function classes generated by parameterized differential operators. Future work may involve studying other geometric properties of the introduced class such as subordination relationships, integral transforms, or bi-univalent function analogues. Furthermore, the operator may be applied to investigate subclasses associated with special functions or orthogonal polynomials.

REFERENCES

1. Al-Oboudi, F. M. (2004). On univalent functions defined by a generalized Sălăgean operator. International Journal of Mathematics and Mathematical Sciences, 27:1429–1436.
2. Amourah, A. A. and Yousef, F. (2020). Some properties of a class of analytic functions involving a new generalized differential operator. Boletim da Sociedade Paranaense de Matem´atica, 38(6):33–42.
3. Darus, M. and Ibrahim, R. W. (2009). On subclasses for generalized operators of complex order. Far East Journal of Mathematical Sciences, 33(3):299–308.
4. Fatunsin, L. M. and Opoola, T. O. (2017). New results on subclasses of analytic functions defined by opoola differential operator. Journal of Mathematics and System Science, 7:289–295.
5. Olukoya, O. A. and Oyekan, E. A. (2020). Coefficient bounds for the function in the class of modified hyperbolic tangent function. Coast Journal of the Faculty of Science, 1(2):222 224.
6. Opoola, O. O. (2017). On a subclass of univalent functions defined by a generalized differential operator. International Journal of Mathematical Analysis, 11(18):869–876.
7. Oyekan, E. A., Awolere, I. T., and Olukoya, O. A. (2025). Univalent function subclasses defined via a new extension of the Sălăgean operator. In Proceedings of the 3rd International Conference, American University of Nigeria, volume 3, pages 680–693.
8. Oyekan, E. A., Lasode, A. O., Olukoya, O. A., and Adepoju, P. O. (2023). Second Hankel determinant for a certain class of bi-univalent functions associated with Sălăgean derivative operator. European Journal of Mathematics and Applications, 3(15):1–11.
9. Ramadan, S. F. and Darus, M. (2011). On the Fekete– Szegö inequality for a class of analytic functions defined by using generalized differential operator. Acta Universitatis Apulensis, 26:167–178.
10. Sălăgean, G. S. (1983). Subclasses of univalent functions. pages 362–372. 12
11. Swamy, S. R. (2012). On univalent functions defined by a new generalized multiplier differential operator. Journal of Mathematical and Computational Science, 2(5):1233–1240