

COEFFICIENT ESTIMATES AND FEKETE–SZEGŐ INEQUALITY FOR NEW SUBCLASS OF BI-BAZILEVIČ FUNCTIONS BY (s, t)-DERIVATIVE OPERATOR AND QUASI-SUBORDINATION

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Abstract. In this paper we introduce and investigate a new generalized class of bi-bazilevič functions defined by using (s, t) -derivative operator and quasi-subordination in the open unit disk \mathbb{D} . We obtain two kinds of coefficient estimate by using Faber polynomial expansion and get Fekete–Szegő inequality for the new class and some of its subclasses.

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REFERENCES

- [1] M. S. ROBERTSON, *Quasi-subordination and coefficient conjectures*, Bulletin of the American Mathematical Society 76, 1–9 (1970).
- [2] S. Y. LEE, *Quasi-subordinate functions and coefficient conjectures*, Journal of the Korean Mathematical Society 12 (1), 43–50 (1975).
- [3] F. Y. REN, S. OWA, S. FUKUI, *Some inequalities on quasi-subordinate functions*, Quasi-subordinate functions and coefficient conjectures Bulletin of the Australian Mathematical Society 43 (2), 317–324 (1991).
- [4] M. M. MOHD, M. DARUS, *Fekete-Szegő problems for quasi-subordination classes*, J. Abstract and Applied Analysis, Article ID.192956, 14 pages, doi:10.1155/2012/192956 (2012).
- [5] B. SRUTHA, S. PREMA, *Coefficient problem for certain subclass of analytic functions using quasi-subordination*, J. Mathematics and Decision sciences 13 (6), 47–53 (2013).
- [6] AMOL B. PATIL, UDAY H. NAIK, *Estimates on initial coefficients of certain subclasses of bi-univalent functions associated with quasi-subordination*, Global Journal of Mathematical Analysis, 5 (1), 6–10 (2017).
- [7] S. P. GOYAL, ONKAR SINGH, ROHIT MUKHERJEE, *Certain results on a subclass of analytic and bi-univalent functions associated with coefficient estimates and quasi-subordination*, Palestine Journal of Mathematics 5 (1) (2016), 79–85.
- [8] Ş. ALTINKAYA, S. YALÇIN, *Quasi-subordinations for certain subclasses of bi-univalent functions*, Mathematical Advances in Pure and Applied Sciences 1 (2), 56–64 (2018).
- [9] P. L. DUREN, *Univalent Functions*, Grundlehren der Mathematischen Wissenschaften, vol. 259, Springer-Verlag, New York, 1983.
- [10] M. LEWIN, *On a coefficient problem for bi-univalent functions*, Proc. Amer. Math. Soc. 18, 63–68 (1967).
- [11] D. A. BRANNAN, J. G. CLUNIE, *Aspects of contemporary complex analysis*, In: Proceedings of the NATO Advanced Study Institute Held at the University of Durham, New York, NY, USA: Academic Press, 1980.
- [12] E. NETANYAHU, *The minimal distance of the image boundary from the origin and the second coefficient of a univalent function in $|z| < 1$* , Arch. Rational Mech. Anal. 32, 100–112 (1969).
- [13] A. W. KEDZIERAWSKI, *Some remarks on bi-univalent functions*, Ann Univ Mariae Curie-Skłodowska Sect A, 39, 77–81 (1985).

- [14] D. L. TAN, *Coefficient estimates for bi-univalent functions*, Chinese Ann Math Ser A, 5, 559–568 (1984).
- [15] D. A. BRANNAN, T. S. TAHA, *On some classes of bi-univalent functions*, In: Mazhar S. M., Hamoui A., Faour N. S., editors, KFAS Proceedings Series, Vol. 3. Oxford, UK: Pergamon Press, 53–60, 1988.
- [16] H. M. SRIVASTAVA, A. K. MISHRA, P. GOCHHAYAT, *Certain subclasses of analytic and bi-univalent functions*, Appl. Math. Lett., 23, 1188–1192 (2010).
- [17] B. A. FRASIN, M. K. AOUF, *New subclasses of bi-univalent functions*, Appl. Math. Lett. 24, 1569–1573 (2011).
- [18] T. HAYAMI, S. OWA, *Coefficient bound for bi-univalent functions*, Pan Amer. Math. J. 22, 15–26 (2012).
- [19] Q.-H. XU, H.-G. XIAO AND H. M. SRIVASTAVA, *A certain general subclass of analytic and bi-univalent functions and associated coefficient estimate problems*, Appl. Math. Comput. 218, 11461–11465 (2012).
- [20] S. P. GOYAL, P. GOSWAMI, *Estimate for initial Maclaurin coefficients of bi-univalent functions for a class defined by fractional derivatives*, J. Egyptian Math. Soc. 20, 179–182 (2012).
- [21] EL-ASHWAH, *Subclasses of bi-univalent functions defined by convolution*, J. Egyptian Math. Soc. 22 (3), 348–351 (2014).
- [22] S. BULUT, *Coefficient estimates for a new subclass of analytic and bi-univalent functions*, An. Stiint. Univ. Al. I. Cuza Iasi Mat. (N. S.) 62, 305–311 (2016).
- [23] R. VIJAYA, T. V. SUDHARSAN, S. SIVASUBRAMAIAAN, *Coefficient estimates for certain subclasses of bi-univalent functions defined by convolution*, International Journal of Analysis, Article ID6958098, 5 pages (2016).
- [24] A. MOTAMEDNEZHAD, SHAHPOUR NOSRATI, S. ZAKER, *Bounds for initial maclaurin coefficients of a subclass of bi-univalent functions associated with subordination*, Commun. Fac. Sci. Univ. Ank. Ser. A1 Math. Stat. 68 (1), 125–135 (2019).
- [25] P. ZAPRAWA, *On the Fekete-Szegő problem for classes of bi-univalent functions*, Bull. Belg. Math. Soc. Simon Stevin 21 (1), 169–178 (2014).
- [26] YALÇIN S. ALTINKAYA, *The Fekete-Szegő problem for a general class of bi-univalent functions satisfying subordinate conditions*, Sahand Communications in Mathematical Analysis, 5 (1), 1–7 (2017).
- [27] J. M. JAHANGIRI, N. MAGESH, J. YAMIN, *Fekete-Szegő inequalities for classes of bi-starlike and bi-convex functions*, Electronic J. Math. Anal. Appl., 3 (1), 133–140 (2015).
- [28] G. SARAVANAN, K. MUTHUNAGAI, *Coefficient estimates and Fekete-Szegő inequality for a subclass of bi-univalent functions defined by symmetric q -derivative operator by using Faber Polynomial techniques*, Periodicals of Engineering and Natural Sciences, 6 (1), 241–250 (2018).
- [29] Ş. ALTINKAYA, S. YALÇIN, *Estimates on coefficients of a general subclass of bi-univalent functions associated with symmetric q -derivative operator by means of the chebyshev polynomials*, Asia Pacific Journal of Math. 4 (2) 90–99 (2017).
- [30] J. M. JAHANGIRI, S. G. HAMIDI, *Coefficient estimates for certain classes of bi-univalent functions*, Int. J. Math. Math. Sci. Article ID:190560, 1–4 (2013).
- [31] J. M. JAHANGIRI, S. G. HAMIDI, *Advances on the coefficients of bi-prestarlike functions*, C. R. Acad. Sci. Paris, Ser. I 354, 980–985 (2016).
- [32] S. G. HAMIDI, J. M. JAHANGIRI, *Faber polynomial coefficients of bi-univalent functions defined by subordinations*, Bull. Iran. Math. Soc., 41 (5), 1103–1119 (2015).
- [33] ŞAHSENE ALTINKAYA, AİBEL YALÇIN, *On the Faber polynomial coefficient bounds of bi-bazilevibi-bazilevič functions functions*, Commun. Fac. Sci. Univ. Ank. Series A1, 66 (2), 289–296 (2017).
- [34] C. RAMACHANDRAN, D. KAVITHA, *Faber polynomial coefficient of bi-univalent functions with respect to symmetric q -derivative operator*, International Journal of Pure and Applied Mathematics, 116 (2), 391–401 (2017).
- [35] S. BULUT, *Coefficient estimates for a subclass of analytic bi-univalent functions by means of Faber polynomial expansion*, Palestine Journal of Mathematics, 7 (1), 53–59 (2018).
- [36] S. YALÇIN, S. KHAN, S. HUSSAIN, *Faber polynomial coefficients estimates of bi-univalent functions associated with generalized Sălăgean q -differential operator*, Konuralp Journal of Mathematics, 7 (1), 25–32 (2019).
- [37] R. CHAKRABARTI, R. JAGANNATHAN, *A (p, q) -oscillator realization of two-parameter quantum algebras*, J. Phys. A, 24, 711–718 (1991).

- [38] A. MOTAMEDNEZHAD, S. SALEHIAN, *New subclass of bi-univalent functions by (p, q) -derivative operator*, Honan Mathematical J. 41 (2), 381–390 (2019).
- [39] F. H. JACKSON, *On q -functions and a certain difference operator*, Trans. Roy. Soc. Edinburgh, 46, 253–281 (1908).
- [40] H. AIRAULT, A. BOUALL, *Differential calculus on the Faber polynomials*, Bull. Sci. Math., 130 (3), 179–222 (2006).
- [41] H. AIRAULT, *Remarks on Faber polynomials*, Int. Math. Forum, 3 (9–12), 449–456 (2008).
- [42] H. AIRAULT, JIAGANG REN, *An algebra of differential operators and generating functions on the set of univalent functions*, Bull. Sci. Math., 126 (5), 343–367 (2002).
- [43] C. POMMERENKE, *Univalent functions*, Vandenhoeck and Ruprecht, Gottingen, 1975.