

ON A CLASS OF QUOTIENT FUNCTIONS

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Abstract. In this manuscript, we consider a class of quotient functions having fixed second coefficient described on open unit disk. We obtain the growth and distortion theorems for such class. Moreover, we examine the radius of lemniscate starlikeness, lune starlikeness, parabolic starlikeness, sine starlikeness, exponential starlikeness and several other radius estimates for such class.

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REFERENCES

- [1] R. M. ALI, N. E. CHO, N. K. JAIN AND V. RAVICHANDRAN, *Radii of starlikeness and convexity for functions with fixed second coefficient defined by subordination*, *Filomat* **26**, 3 (2012), 553–561.
- [2] R. M. ALI, N. K. JAIN AND V. RAVICHANDRAN, *Radii of starlikeness associated with the lemniscate of Bernoulli and the left-half plane*, *Appl. Math. Comput.* **218**, 11 (2012), 6557–6565.
- [3] R. M. ALI, V. KUMAR, V. RAVICHANDRAN AND S. S. KUMAR, *Radius of starlikeness for analytic functions with fixed second coefficient*, *Kyungpook Math. J.* **57**, 3 (2017), 473–492.
- [4] S. ANAND, N. K. JAIN AND S. KUMAR, *Normalized analytic functions with fixed second coefficient*, *J. Anal.* **31**, 3 (2023), 1917–1938.
- [5] S. ANAND, N. K. JAIN AND S. KUMAR, *Certain estimates of normalized analytic functions*, *Math. Slovaca* **72**, 1 (2022), 85–102.
- [6] N. E. CHO, V. KUMAR, S. S. KUMAR AND V. RAVICHANDRAN, *Radius problems for starlike functions associated with the sine function*, *Bull. Iranian Math. Soc.* **45**, 1 (2019), 213–232.
- [7] S. GANDHI AND V. RAVICHANDRAN, *Starlike functions associated with a lune*, *Asian-Eur. J. Math.* **10**, 4 (2017), 12 pp.
- [8] T. H. GRONWALL, *On the distortion in conformal mapping when the second coefficient in the mapping function has an assigned value*, *Nat. Acad. Proc.* **6**, (1920), 300–302.
- [9] V. P. GUPTA, P. K. JAIN AND I. AHMAD, *On the radius of univalence of certain classes of analytic functions with fixed second coefficient*, *Rend. Mat. (6)*, **12**, 3–4 (1979) (1980), 423–430.
- [10] W. JANOWSKI, *Some extremal problems for certain families of analytic functions, I.*, *Ann. Polon. Math.* **28**, (1973), 297–326.
- [11] W. KAPLAN, *Close-to-convex schlicht functions*, *Michigan Math. J.* **1**, (1952) (1953), 169–185.
- [12] V. KUMAR, *On univalent functions with fixed second coefficient*, *Indian J. Pure Appl. Math.* **14**, 11 (1983), 1424–1430.
- [13] S. KUMAR AND V. RAVICHANDRAN, *A subclass of starlike functions associated with a rational function*, *Southeast Asian Bull. Math.* **40**, 2 (2016), 199–212.
- [14] S. KUMAR, V. RAVICHANDRAN AND S. VERMA, *Initial coefficients of starlike functions with real coefficient*, *Bull. Iranian Math. Soc.* **43**, 6 (2017), 1837–1854.
- [15] S. K. LEE, V. RAVICHANDRAN AND S. SUPRAMANIAM, *Applications of differential subordination for functions with fixed second coefficient to geometric function theory*, *Tamsui Oxf. J. Inf. Math. Sci.* **29**, 2 (2013), 267–284.
- [16] W. C. MA AND D. MINDA, *A unified treatment of some special classes of univalent functions*, in *Proceedings of the Conference on Complex Analysis (Tianjin, 1992)*, 157–169, *Conf. Proc. Lecture Notes Anal.*, I, Int. Press, Cambridge, MA.

- [17] T. H. MACGREGOR, *The radius of convexity for starlike functions of order $\frac{1}{2}$* , Proc. Amer. Math. Soc. **14**, (1963), 71–76.
- [18] C. P. MCCARTY, *Functions with real part greater than α* , Proc. Amer. Math. Soc. **35**, (1972), 211–216.
- [19] S. MAHMOOD AND S. MUSTAFA, *Certain classes of k -uniformly functions with bounded radius rotation associated with linear operator*, Hacet. J. Math. Stat. **49**, 1 (2020), 56–67.
- [20] R. MENDIRATTA, S. NAGPAL AND V. RAVICHANDRAN, *On a subclass of strongly starlike functions associated with exponential function*, Bull. Malays. Math. Sci. Soc. **38**, 1 (2015), 365–386.
- [21] Z. NEHARI, *Conformal mapping*, McGraw-Hill Book Co., Inc., New York, Toronto, London, (1952).
- [22] D. Z. PAŠKULEVA, *On the radius of alpha-starlikeness for starlike functions of order beta and fixed second coefficient*, Pliska Stud. Math. Bulgar. **10**, (1989), 157–163.
- [23] M. S. ROBERTSON, *Certain classes of starlike functions*, Michigan Math. J. **32**, 2 (1985), 135–140.
- [24] F. RØNNING, *Uniformly convex functions and a corresponding class of starlike functions*, Proc. Amer. Math. Soc. **118**, 1 (1993), 189–196.
- [25] A. SEBASTIAN AND V. RAVICHANDRAN, *Radius of starlikeness of certain analytic functions*, Math. Slovaca **71**, 1 (2021), 83–104.
- [26] T. N. SHANMUGAM AND V. RAVICHANDRAN, *Certain properties of uniformly convex functions*, in Computational methods and function theory (Penang), 319–324, Ser. Approx. Decompos. **5**, World Sci. Publ., River Edge, NJ (1994).
- [27] K. SHARMA, N. K. JAIN AND V. RAVICHANDRAN, *Starlike functions associated with a cardioid*, Afr. Mat. **27**, (5–6) (2016), 923–939.
- [28] J. SOKÓŁ AND J. STANKIEWICZ, *Radius of convexity of some subclasses of strongly starlike functions*, Zeszyty Nauk. Politech. Rzeszowskiej Mat. No. **19**, (1996), 101–105.
- [29] D. E. TEPPER, *On the radius of convexity and boundary distortion of Schlicht functions*, Trans. Amer. Math. Soc. **150**, (1970), 519–528.
- [30] L. A. WANI AND A. SWAMINATHAN, *Starlike and convex functions associated with a nephroid domain*, Bull. Malays. Math. Sci. Soc. **44**, 1 (2021), 79–104.