

SHARP INEQUALITIES FOR ZALCMAN FUNCTIONAL OF LOGARITHMIC COEFFICIENTS OF INVERSE FUNCTIONS IN CERTAIN CLASSES OF ANALYTIC FUNCTIONS

ADAM LECKO* AND BARBARA ŚMIAROWSKA

Abstract. We study Hankel matrices whose entries are logarithmic coefficients of inverse functions in selected subclasses of analytic functions. Particularly, we give sharp bounds for the second Hankel determinant which reduces to Zalcman functional of logarithmic coefficients of inverse convex and starlike functions, as well as of functions of bounded turning.

Mathematics subject classification (2020): 30C45, 30C50.

Keywords and phrases: Univalent functions, convex functions, starlike functions, functions of bounded turning, Hankel determinant, logarithmic coefficients.

REFERENCES

- [1] N. E. CHO, B. KOWALCZYK, O. S. KWON, A. LECKO, Y. J. SIM, *The bound of the Hankel determinant for strongly starlike functions of order alpha*, J. Math. Inequal. **11** (2017), no. 2, 429–439.
- [2] N. E. CHO, B. KOWALCZYK AND A. LECKO, *The sharp bounds of some coefficient functionals over the class of functions convex in the direction of the imaginary axis*, Bull. Aust. Math. Soc. **100** (2019), 86–96.
- [3] J. H. CHOI, Y. C. KIM, T. SUGAWA, *A general approach to the Fekete-Szegö problem*, J. Math. Soc. Japan **59** (2007), 707–727.
- [4] P. L. DUREN, *Univalent functions*, Springer-Verlag, 1983.
- [5] M. ELIN, D. SHOKHET, *Linearization Models for Complex Dynamical Systems, Operator Theory: Advances and Applications*, **208**, Birkhäuser Verlag, Basel, 2010.
- [6] A. W. GOODMAN, *Univalent Functions*, Mariner Publishing Company, Inc., Tampa, Florida, 1983.
- [7] B. KOWALCZYK, A. LECKO, *Second Hankel determinant of logarithmic coefficients of convex and starlike functions*, Bull. Aust. Math. Soc. **105** (2022), 458–467.
- [8] B. KOWALCZYK, A. LECKO, *Second Hankel Determinant of Logarithmic Coefficients of Convex and Starlike Functions of Order Alpha*, Bull. Malays. Math. Sci. Soc. **45** (2022), 727–740.
- [9] B. KOWALCZYK, A. LECKO, Y. J. SIM, *The sharp bound for the Hankel determinant of the third kind for convex functions*, Bull. Aust. Math. Soc. **97** (2018), 435–445.
- [10] B. KOWALCZYK, A. LECKO, D. K. THOMAS, *The sharp bound of the third Hankel determinant for starlike functions*, Forum Math. **34** (2022), no. 5, 1249–1254.
- [11] B. KOWALCZYK, A. LECKO, D. K. THOMAS, *The sharp bound of the third Hankel determinant for convex functions of order $-1/2$* , J. Math. Inequal. **17** (2023), no. 1, 191–204.
- [12] S. L. KRUSHKAL, *Univalent functions and holomorphic motions*, J. Analyse Math. **66** (1995), 253–275.
- [13] S. L., KRUSHKAL, *Proof of the Zalcman conjecture for initial coefficients*, Georgian Math. J. **17** (2010), 663–681.
- [14] T. H. MACGREGOR, *The radius of univalence of certain analytic functions*, Proc. Amer. Math. Soc. **14** (1963), 514–520.
- [15] I. M. MILIN, *Univalent Functions and Orthonormal Systems*, Nauka, Moscow, 1971 (in Russian); English translation, Translations of Mathematical Monographs, **49** American Mathematical Society, Providence, RI, 1977.

- [16] C. POMMERENKE, *Univalent Functions*, Vandenhoeck & Ruprecht, Göttingen, 1975.
- [17] J. S. RATTI, *The radius of univalence of certain analytic functions*, Math. Z. **107** (1968), 241–248.
- [18] D. SHOIKHET, *Rigidity and parametric embedding of semi-complete vector fields on the unit disk*, Milan J. Math. **84** (2016), no. 1, 159–202.