

WEAKLY WEIGHTED AND RELAXED WEIGHTED SHARING OF DIFFERENTIAL DIFFERENCE POLYNOMIALS OF ENTIRE FUNCTIONS

GURUDAS BISWAS

Abstract. In the paper we apply the idea of weakly weighted sharing and relaxed weighted sharing to trace the uniqueness problems of entire functions whose differential difference polynomials share a small function. The results of the paper improve and extend some recent results due to V. HUSNA, S. RAJESHWARI AND S. H. NAVEEN KUMAR [Electronic Journal of Mathematical Analysis and Applications, **9** (2021), 248–260].

Mathematics subject classification (2020): 30D35.

Keywords and phrases: Weakly weighted sharing, relaxed weighted sharing, entire function, differential difference polynomial.

REFERENCES

- [1] T. ALZAHARY, *Uniqueness of meromorphic functions with weakly weighted sharing*, Bull. Aust. Math. Soc., **88**, (2013), 26–43.
- [2] A. BANERJEE AND S. MUKHERJEE, *Uniqueness of meromorphic functions concerning differential monomials sharing the same value*, Bull. Math. Soc. Sci. Math. Roum., **50**, (2007), 191–206.
- [3] A. BANERJEE AND S. MUKHERJEE, *Nonlinear differential polynomials sharing a small function*, Archivum Mathematicum, **44**, (2008), 41–56.
- [4] W. BERGWELER AND J. K. LANGLEY, *Zeros of differences of meromorphic functions*, Math. Proc. Camb. Phil. Soc., **142**, (2007), 133–147.
- [5] Y. M. CHIANG AND S. J. FENG, *On the Nevanlinna Characteristic $f(z + \eta)$ and difference equations in complex plane*, Ramanujan J., **16** (2008), 105–129.
- [6] M. L. FANG AND W. HONG, *A unicity theorem for entire functions concerning differential polynomials*, Indian J. Pure Appl. Math., **32** (2001), 1343–1348.
- [7] W. K. HAYMAN, *Meromorphic Functions*, The Clarendon Press, Oxford (1964).
- [8] V. HUSNA, S. RAJESHWARI AND S. H. NAVEEN KUMAR, *A note on uniqueness of transcendental entire functions concerning differential difference polynomials of finite order*, Electronic Journal of Mathematical Analysis and Applications, **9** (2021), 248–260.
- [9] S. KARAGUPPI, V. NAGARJUN AND G. SHARMA, *Uniqueness results related to value distribution of entire and meromorphic functions concerning difference polynomials*, International Journal of Mathematics Trends and Technology, **67** (2021), 112–124.
- [10] I. LAHIRI, *Value distribution of certain differential polynomials*, Int. J. Math. Math. Sc., **28** (2001), 83–91.
- [11] I. LAHIRI, *Weighted value sharing and uniqueness of meromorphic functions*, Complex Var. Theory Appl., **46** (2001), 241–253.
- [12] I. LAHIRI AND B. PAL, *Uniqueness of meromorphic functions with their homogeneous and linear differential polynomials sharing a small function*, Bull. Korean Math. Soc., **54** (2017), 825–838.
- [13] I. LAINE, *Nevanlinna Theory and Complex Differential Equations*, Walter de Gruyter, Berlin/New York (1993).
- [14] I. LAINE AND C. C. YANG, *Value distribution of difference polynomials*, Proc. Japan Acad., Ser. A, Math. Sci., **83** (2007), 148–151.
- [15] S. H. LIN AND W. C. LIN, *Uniqueness of meromorphic functions concerning weakly weighted sharing*, Kodai Math. J., **29** (2006), 269–280.

- [16] W. C. LIN AND H. X. YI, *Uniqueness theorems for meromorphic functions concerning fixed points*, Complex Variables Theory Appl., **49** (2004), 793–806.
- [17] K. LIU AND L. Z. YANG, *Value distribution of the difference operator*, Arch. Math. Basel, **92** (2009), 270–278.
- [18] X. LUO AND W. C. LIN, *Value sharing results for shifts of meromorphic functions*, J. Math. Anal. Appl., **377** (2011), 441–449.
- [19] X. Q. LIN AND W. C. LIN, *Uniqueness of entire functions sharing one value*, Acta Math. Sci., Ser. B, Engl. Ed., **31** (2011), 1062–1076.
- [20] C. MENG, *Uniqueness for meromorphic functions and differential polynomials*, Turk. J. Math., **33** (2009), 331–340.
- [21] C. MENG, *On unicity of meromorphic function and its k th order derivative*, Journal of Mathematical Inequalities, **4** (2010), 151–159.
- [22] C. MENG, *Uniqueness of entire functions concerning difference polynomials*, Math. Bohemica, **139** (2014), 89–97.
- [23] D. C. PRAMANIK AND J. ROY, *Weakly weighted-sharing and uniqueness of homogeneous differential polynomials*, Mat. Stud., **51** (2019), 41–49.
- [24] D. C. PRAMANIK AND J. ROY, *Uniqueness of homogeneous differential polynomials of meromorphic functions concerning weakly weighted sharing*, Journal of Classical Analysis, **16** (2020), 23–35.
- [25] D. C. PRAMANIK AND J. ROY, *Uniqueness of $p(f)$ and $P[f]$ concerning weakly weighted-sharing*, General Mathematics, **28** (2020), 11–24.
- [26] X. G. QI, L. Z. YANG AND K. LIU, *Uniqueness and periodicity of meromorphic functions concerning the difference operator*, Computers and Mathematics with Applications, **60** (2010), 1739–1746.
- [27] P. SAHOO, *Uniqueness of entire functions related to difference polynomials*, Commu. Math. Stat., **3** (2015), 227–238.
- [28] P. SAHOO AND G. BISWAS, *Some results on uniqueness of entire functions concerning difference polynomials*, Tamkang journal of Mathematics, **49** (2018), 85–97.
- [29] C. C. YANG, *On deficiencies of differential polynomials II*, Math. Z., **125** (1972), 107–112.
- [30] C. C. YANG AND H. X. YI, *Uniqueness Theory of Meromorphic Functions*, Kluwer, Dordrecht (2003).
- [31] J. L. ZHANG, *Value distribution and shared sets of difference of meromorphic functions*, J. Math. Anal. Appl., **367** (2010), 401–408.
- [32] J. L. ZHANG AND L. Z. YANG, *Some results related to a conjecture of R. Bruck*, J. Inequal. Pure Appl. Math., **8** (2007), Art. 18.