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UNIQUENESS FUNCTIONS CONCERNING DIFFERENCE OPERATOR SHARING A POLYNOMIAL WITH FINITE WEIGHT

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Abstract. In this study, we examine the uniqueness results when two difference polynomials of meromorphic (entire) functions share a nonzero polynomial of finite weight, using the notion of weighted sharing of values. Additionally, we examine the various possibilities for $P(z)$. The results of the paper improve and generalize the recent results due to Liu et al. [14] and Liu et al. [15].

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REFERENCES

[1] A. BANERJEE, *Meromorphic functions sharing one value*, Int. J. Math. Math. Sci., **22**, (2005), pp. 3587–3598.
[2] A. BANERJEE AND S. MAJUMDER, *Uniqueness of certain type of differential-difference and difference polynomials*, Tamkang J. Math., **49**, 1 (2018), pp. 1–24.
[3] A. BANERJEE AND T. BISWAS, *On the value sharing of shift monomial of meromorphic functions*, Surv. Math. Appl., **15**, (2020), pp. 341–369.
[4] W. BERGWEILER AND J. K. LANGLEY, *Zeros of differences of meromorphic functions*, Math. Proc. Cambridge Philos. Soc., **142**, 1 (2007), pp. 33–147.
[5] Y. M. CHIANG AND S. J. FENG, *On the Nevanlinna characteristic of $f(z+\eta)$ and difference equations in the complex plane*, Ramanujan J., **16**, 1 (2008), pp. 105–129.
[6] R. G. HALBURD AND R. KORHONEN, *Nevanlinna theory for the difference operator*, Ann. Acad. Sci. Fenn. Math., **31**, (2006), pp. 463–478.
[7] R. G. HALBURD AND R. J. KORHONEN, *Difference analogue of the lemma on the logarithmic derivative with application to difference equations*, J. Math. Anal. Appl., **314**, 2 (2006), pp. 477–487.
[8] G. HALDAR, *Uniqueness of entire functions concerning differential-difference polynomials sharing small functions*, The Journal of Anal., (2022), pp. 1–22.
[9] W. K. HAYMAN, *Meromorphic functions*, Oxford: Clarendon Press, 1964.
[10] J. HEITTOKANGAS AND R. KORHONEN, I. LAINE AND J. RIEPPO, *Uniqueness of meromorphic functions sharing values with their shifts*, Complex Var. Elliptic Equ., **56**, (1–4) (2011), pp. 81–92.
[11] J. HEITTOKANGAS AND R. KORHONEN, I. LAINE, J. RIEPPO AND J. L. ZHANG, *Value sharing results for shifts of meromorphic functions, and sufficient conditions for periodicity*, J. Math. Anal. Appl., **355**, 1 (2009), pp. 352–363.
[12] I. LAHIRI, *Value distribution of certain differential polynomials*, Int. J. Math. Math. Sci., **28**, (2001), pp. 83–91.
[13] I. LAHIRI, *Weighted value sharing and uniqueness of meromorphic functions*, Complex Variables Theory Appl., **46**, 3 (2001), pp. 241–253.
[14] K. LIU, X. L. LIU AND T. B. CAO, *Value distributions and uniqueness of difference polynomials*, Adv. Difference Equ., (2011), Article ID 234215, 12 pages.
[15] Y. LIU, J. P. WANG AND F. H. LIU, *Some results on value distribution of the difference operator*, Bull. Iranian Math. Soc., **41**, 3 (2015), pp. 603–611.

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[16] K. LIU, X. L. LIU AND T. B. CAO, *Some results on zeros and uniqueness of difference-differential polynomials*, Appl. Math. J. Chinese Univ. Ser. B, **27**, 1 (2012), pp. 94–104.
[17] X. LUO AND W. C. LIN, *Value sharing results for shifts of meromorphic functions*, J. Math. Anal. Appl., **377**, 2 (2011), pp. 441–449.
[18] M. M. MANAKAME AND H. P. WAGHAMORE, *Weighted sharing of meromorphic functions concerning certain type of linear difference polynomials*, Ratio Mathematica, **48**, (2023), pp. 305–321.
[19] B. N. NAVEENKUMAR AND H. P. WAGHAMORE, *Some Results on Uniqueness of Meromorphic Functions Regarding Shifts and Derivatives*, Int. J. of Diff. Eqn., **18**, 1 (2023), pp. 251–265.
[20] B. N. NAVEENKUMAR AND H. P. WAGHAMORE, *Zeros and Weighted value sharing of q-shift difference-differential polynomials of entire and meromorphic functions*, J. of Fractional. Calc. and Appl., **15**, 1 (2024), pp. 1–20.
[21] M. ROOPA AND H. P. WAGHAMORE, *Results Related to Value Distribution and Uniqueness of Entire Functions Concerning with Difference Polynomials*, Int. J. of Diff. Eqn., **18**, 2 (2023), pp. 331–342.
[22] X. Y. XU, *On the value distribution and difference polynomials of meromorphic functions*, Adv. Diff. Equ., **90**, 1 (2013), 13 pages.
[23] H. P. WAGHAMORE AND R. MALIGI, *Meromorphic functions concerning difference operator*, Jordan J. of Math. and Stat. (JJMS), **12**, 4 (2019), pp. 521–540.
[24] H. P. WAGHAMORE AND P. N. RAJ, *Uniqueness results on meromorphic functions concerning their shift and differential polynomial*, Serdica Math. J., **47**, (2021), pp. 191–212.
[25] H. P. WAGHAMORE AND P. N. RAJ, *Uniqueness of Q-difference of meromorphic functions sharing a small function with finite weight*, Creat. Math. Inform., **32**, 2 (2023), pp. 201–218.
[26] C. C. YANG AND H. X. YI, *Uniqueness theory of meromorphic functions*, Dordrecht: Kluwer Academic Publishers Group, (2003).
[27] C. C. YANG, *On deficiencies of differential polynomials II*, Math. Z., **125**, (1972), pp. 107–112.