

SOME RESULTS ON THE UNIQUENESS OF CERTAIN TYPE OF NONLINEAR DIFFERENTIAL POLYNOMIALS WITH REGARD TO MULTIPLICITY SHARING A SMALL FUNCTION

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ABSTRACT. In this article, we consider the uniqueness problem of the non linear differential polynomial $f^n(z)(f(z) - 1)^m P[f]$, where $f(z)$ is a transcendental meromorphic function. With the concept of weakly weighted sharing and relaxed weighted sharing we obtain some results which extend and improve some results due to the present first author [Korean J. Math., **28**(2020), No. 4, 871-888].

REFERENCES

- [1] A. Banerjee: *On uniqueness of meromorphic functions when two differential monomials share one value*, Bull. Korean Math. Soc., **44**(2007), No. 4, 607-622.
- [2] A. Banerjee and S. Mukherjee: *Uniqueness of meromorphic functions concerning differential monomials sharing the same value*, Bull. Math. Soc. Sci. Math. Roumanie (N.S.), **50**(2007), 191-206.
- [3] 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**(2008), 105-129.
- [4] R.G. Halburd and R.J. Korhonen: *Nevanlinna theory for the difference operator*, Ann. Acad. Sci. Fenn. Math., **31**(2006), 463-478.
- [5] 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**(2006), 477-487.
- [6] W.K. Hayman: *Meromorphic Functions*, Clarendon Press, Oxford, 1964 (OMM).
- [7] I. Laine: *Nevanlinna Theory and Complex Differential Equations*, Walter de Gruyter, Berlin/New York, 1993 (GSM 15).
- [8] I. Laine and C.C. Yang: *Value distribution of difference polynomials*, Proc. Japan Acad. Ser. A Math. Sci., **83**(2007), 148-151.
- [9] S.H. Lin and W.C. Lin: *Uniqueness of meromorphic functions concerning weakly weighted sharing*, Kodai Math. J., **29**(2006), 269-280.
- [10] C. Meng: *Uniqueness of entire functions concerning difference polynomials*, Math. Bohem., **139**(2014), 89-97.
- [11] H.P. Waghmare and S.H. Naveenkumar: *Results on uniqueness of meromorphic functions of differential polynomials*, Malaya J. Mat., **6**(2018), No. 1, 14-20.
- [12] X.G. Qi, L.Z. Yang and K. Liu: *Uniqueness and periodicity of meromorphic functions concerning the difference operator*, Comput. Math. Appl., **60**(2010), 1739-1746.
- [13] P. Sahoo: *Uniqueness of entire functions related to difference polynomials*, Commun. Math. Stat., **3**(2015), 227-238.
- [14] B. Saha: *On the uniqueness of certain type of shift polynomials sharing a small function*, Korean J. Math., **28**(2020), No. 4, 871-888.
- [15] H.X. Yi and C.C. Yang: *Uniqueness Theory of Meromorphic Functions*, Science Press, Beijing, 1995.

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- [16] J.L. Zhang and L.Z. Yang: *Some results related to a conjecture of R. Brück*, J. Inequal. Pure Appl. Math., **8**(2007), Art. No. 18, 11 pages.

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