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UNIQUENESS OF MEROMORPHIC FUNCTIONS WHEN TWO DIFFERENTIAL POLYNOMIALS SHARE A SET OF ROOTS OF UNITY

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Abstract. In this paper, we consider the uniqueness problem of meromorphic functions when two differential polynomials share a set of roots of unity ignoring multiplicities. Our results are inspired by a recent work of Khoai and An [Advanced Studies: Euro-Tbilisi Math. J., 15 (2022), 39–51].

1. Introduction, Definitions and Results

In this paper, by meromorphic functions we will always mean meromorphic functions in the complex plane. We adopt the standard notations of the Nevanlinna theory of meromorphic functions as explained in [4, 13]. Let E denote any set of positive real numbers of finite linear measure, not necessarily the same at each occurrence. For a nonconstant meromorphic function f, we denote by $T(r, f)$ the Nevanlinna characteristic of f and by $S(r, f)$ any quantity satisfying $S(r, f) = o\{T(r, f)\}$ as $(r \to \infty, r \notin E)$. For $a \in \mathbb{C} \cup \{\infty\}$, the functions f and g are said to share the value a CM (counting multiplicities) if f and g have the same set of a-points with counting multiplicities. If f and g have the same set of a-points with ignoring multiplicities, then we say that f and g share the value a IM (ignoring multiplicities). For $a \in \mathbb{C} \cup \{\infty\}$ we denote by $E_f(a)$ the set of a-points of f counted with its multiplicities and by $\overline{E}_f(a)$ the set of a-points of f where we do not count its multiplicity. For a nonempty subset $S \subset \mathbb{C} \cup \{\infty\}$, we define

$$E_f(S) = \cup_{a \in S} E_f(a) \quad and \quad \overline{E}_f(S) = \cup_{a \in S} \overline{E}_f(a).$$

Two functions f, g are said to share the set S CM, if $E_f(S) = E_g(S)$, and share the set S IM, if $\overline{E}_f(S) = \overline{E}_g(S)$.

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