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A note on value distribution of nonhomogeneous differential polynomials

(Dedicated to Prof. B.K. Lahiri on his 70th birth anniversary)

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Abstract. In the note we prove a result on value distribution of nonhomogeneous differential polynomials which improves a long standing theorem of C.C. Yang.

Key words: differential polynomial, value distribution.

1. Introduction and Definitions

Let f be a transcendental meromorphic function in the open complex plane $\mathbb{C}$. The problem of investigating possible Picard values of the derivative of f leads to the problem of investigating the value distribution of certain polynomials in f and its derivatives which are called differential polynomials generated by f and is explained in *Definition* 2.

Definition 1 A meromorphic function a is said to be a small function of f if $T(r,a)=S(r,f)$.

Definition 2 [1, 3] Let $n_{0j}, n_{1j}, \ldots, n_{kj}$ be nonnegative integers. The expression $M_j[f]=b_j(f)^{n_{0j}}(f^{(1)})^{n_{1j}}\cdots(f^{(k)})^{n_{kj}}$ is called a differential monomial generated by f of degree $\gamma_{M_j}=\sum_{i=0}^{k} n_{ij}$ and weight $\Gamma_{M_j}=\sum_{i=0}^{k}(i+1)n_{ij}$, where $T(r,b_j)=S(r,f)$.

The sum of the monomials $P[f]=\sum_{i=1}^{l} M_j[f]$ is called a differential polynomial generated by f of degree $\gamma_P=\max\{\gamma_{M_j}:1\le j\le l\}$ and weight $\Gamma_P=\max\{\Gamma_{M_j}:1\le j\le l\}$.

The numbers $\underline{\gamma}_P=\min\{\gamma_{M_j}:1\le j\le l\}$ and k (the highest order of the derivative of f in $P[f]$) are called respectively the lower degree and order of $P[f]$.

$P[f]$ is said to be homogeneous if $\gamma_P=\underline{\gamma}_P$.

Also we denote by γ_P^* the number $\gamma_P^*=\max\{\gamma_{M_j}:\gamma_{M_j}<\gamma_P$ and $1\le j\le l\}$.

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