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THE ZERO, POLE AND ORDER OF MEROMORPHIC SOLUTIONS OF DIFFERENTIAL EQUATIONS WITH MEROMORPHIC COEFFICIENTS*

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Abstract

In this paper, we investigate the complex oscillation of non-homogeneous linear differential equations with meromorphic coefficients under substracting the condition that all solutions of differential equation are meromorphic functions.

1. Introduction and results

Consider non-homogeneous linear differential equations of the form

$$f^{(k)}+b_{k-1}f^{(k-1)}+\cdots+b_0f=H(z) \quad (k\geqq 1) \tag{1.1}$$

where b_{k-j} $(j=1, \cdots, k)$ are rational functions, $H(z)$ is a meromorphic function. Z.-X. Chen and S.-A. Gao proved in [3].

THEOREM A. *Let b_{k-j} $(j=1, \cdots, k)$ be rational functions having a pole at ∞ of order $n_{k-j}\geqq 0$, $k\geqq 1$, $H(z)$ be a meromorphic function, $\sigma(H)=\beta$ satisfying*

$$1+\max_{1\leq j\leq k} n_{k-j}/j<\beta<\infty. \tag{1.2}$$

If all solutions f of the differential equation (1.1) *are meromorphic functions, then*

(a) $\sigma(f)=\beta$.

(b) $\lambda(1/f)=\lambda(1/H)$, $\tilde{\lambda}(1/f)=\tilde{\lambda}(1/H)$. If $\lambda(H)>\lambda(1/H)$, then $\lambda(f)\geqq\lambda(H)$.

(c) *If $\beta>\max\{\lambda(H), \lambda(1/H)\}$, then all solutions of* (1.1) *satisfy $\tilde{\lambda}(f)=\lambda(f)=\sigma(f)=\beta$, except at most a possible one. The possible exceptional one f_0 satisfies $\lambda(f_0)<\beta$.*

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