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MEROMORPHIC SOLUTIONS OF LINEAR DIFFERENCE EQUATIONS

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Abstract. In this paper, we investigate the growth of meromorphic solutions of the linear difference equation

$$a_n(z)f(z+n)+\cdots+a_1(z)f(z+1)+a_0(z)f(z)=b(z),$$

where $a_n(z), \ldots, a_1(z)$, $a_0(z)$ and $b(z)$ are entire functions, and we obtain the relations of the growth order and the exponents of convergence of the solutions of the above equation. We also give some results concerning the Nevanlinna exceptional values of solutions of some linear difference equations.

Keywords. Growth order, difference polynomials, meromorphic functions, periodicity, Nevanlinna exceptional values.

AMS (MOS) subject classification: Primary 30D35; Secondary 30D20.

1 Introduction and main results

In this paper, a function $f(z)$ is called meromorphic, if it is analytic in the finite complex plane $\mathbb{C}$ except at possible isolated poles. If no poles occur, then the function f reducess to an entire function. We assume that the reader is familiar with the fundamental results and the standard notations of the Nevanlinna theory of meromorphic functions(see [6-10]).

We use $\sigma(f)$ to denote the order of a meromorphic function $f(z)$, and use $\lambda(f)$ to denote the exponents of convergence of zeros of $f(z)$, which are defined by

$$\sigma(f)=\limsup_{r\to\infty}\frac{\log T(r,f)}{\log r},$$

$$\lambda(f)=\limsup_{r\to\infty}\frac{\log\log n(r,\frac{1}{f})}{\log r}$$

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