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ITERATION OF n ENTIRE FUNCTIONS WITH FINITE ITERATED ORDER

Mithun Adhikary and Dibyendu Banerjee

Department of Mathematics,
Visva-Bharati, Santiniketan - 731235, INDIA

E-mail : adhikary.421.mithun@gmail.com, dibyendu192@rediffmail.com

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Abstract: After the works of Banerjee and Adhikary [1] on composition of three entire functions with finite iterated order in this paper we investigate some growth properties of n iterated entire functions of finite iterated order.

Keywords and Phrases: Order, Iterated i-order, Entire function, Composition.
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1. Introduction and Definitions

If $f(z)$ and $g(z)$ be two transcendental entire functions, Clunie [5] showed that $\lim_{r\to\infty}\frac{T_{f\circ g}(r)}{T_f(r)}=\infty$ and $\lim_{r\to\infty}\frac{T_{f\circ g}(r)}{T_g(r)}=\infty$. After this many authors [3, 4, 6, 7, 8, 9, 10, 12] made close investigation on composition of two entire functions with finite order and obtained various results. Recently Jin Tu et.al [11] investigated the composition of entire functions with finite iterated order and proved results on comparative growths of $\log^{[p+q]}T_{f\circ g}(r)$ $(p,q)\in\mathbb{N}$ with $\log^{[p]}T_f(r)$ and $\log^{[q]}T_g(r)$. In this paper we study some properties on iteration of functions with finite iterated order and extend some earlier results of Banerjee and Adhikary [1] for composition of n entire functions. We first recall the notion of iterated order [7].

Definition 1.1. *The iterated i order $\rho_i(f)$ and iterated i lower order $\mu_i(f)$ of an entire function f are defined by*

$$\rho_i(f)=\limsup_{r\to\infty}\frac{\log^{[i+1]}M_f(r)}{\log r}=\limsup_{r\to\infty}\frac{\log^{[i]}T_f(r)}{\log r},\ (i\in\mathbb{N})$$