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A STUDY ON GROWTH PROPERTIES OF COMPOSITION OF MEROMORPHIC FUNCTIONS

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ABSTRACT

The growth properties of the composition of meromorphic functions play a vital role in understanding the behavior of complex functions in relation to their growth rates, orders, and value distribution. If two meromorphic functions fff and ggg are composed as f(g(z)) f(g(z)) f(g(z)), the resulting function's growth can differ significantly from that of each function individually. The order of a meromorphic function, which measures its asymptotic growth as |z|→∞|z| \to \infty|z|→∞, is particularly sensitive to composition. The order of f(g(z)) f(g(z)) f(g(z)) is typically influenced by both fff and ggg, and if ggg exhibits rapid growth, it can cause f(g(z)) f(g(z)) f(g(z)) to grow faster, sometimes exponentially. In Nevanlinna theory, which analyzes the value distribution of meromorphic functions, the composition affects how often the composed function takes certain values and how its poles are distributed. For example, the proximity function and counting function, key tools in this theory, help track how frequently f(g(z)) f(g(z)) f(g(z)) approaches infinity or specific values. This is crucial in applications such as differential equations and dynamical systems, where understanding the complex growth behavior of meromorphic compositions enables predictions of system behavior over time. Thus, the composition of meromorphic functions reveals intricate growth properties and complex dynamical structures.