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The second main theorem for small functions and related problems

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1. Introduction

1.1. Results

One of the most interesting results in value distribution theory is the defect relation obtained by R. Nevanlinna: If f is a non-constant meromorphic function on the complex plane $\mathbf{C}$, then for an arbitrary collection of distinct $a_1, ..., a_q \in \mathbf{P}^1$, the following defect relation holds:

$$\sum_{i=1}^{q} (\delta(a_i, f) + \theta(a_i, f)) \leqslant 2. \tag{1.1.1}$$

Here, as usual in Nevanlinna theory, the terms $\delta(a_i, f)$ and $\theta(a_i, f)$ are defined by

$$\delta(a_i, f) = \liminf_{r\to\infty} \left(1 - \frac{N(r, a_i, f)}{T(r, f)}\right),$$

$$\theta(a_i, f) = \liminf_{r\to\infty} \frac{N(r, a_i, f) - \overline{N}(r, a_i, f)}{T(r, f)},$$