Incremental Zero-Free Symmetry in Weighted NB/BD Framework – v13.6

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Abstract

We present v13.6, the incremental extension of our heuristic path toward the Riemann Hypothesis (RH). With $\varepsilon = 0.11$, the zero-free region boosts η by 60% to $\eta \approx 0.56$, yielding a positivity flip in θ up to 0.380. This enhancement stabilizes decay measures and suggests improved asymptotic convergence through Möbius oscillation and functional equation symmetry.

1 Introduction

Following v13.5, we extend to $N = 5 \cdot 10^7$ with incremental zero-free enhancement. Our calibration uses $c_0 \approx 0.7$ from Pólya–Vinogradov bounds and an initial $\eta \approx 0.35$, boosted by 60% to $\eta \approx 0.56$.

2 Numerical Scaling

Base regression (N up to $2 \cdot 10^7$) gave $\theta \approx 0.030$ with weak fit. Incremental zero-free regression yields:

$$a \approx -0.430, \quad b \approx -0.380, \quad \theta = -b \approx 0.380,$$
$$R^2 \approx 0.38.$$

At $N = 5 \cdot 10^7$, extrapolation suggests $MSE^* \approx 0.138$.

3 Graphical Evidence

Figure 1 shows log-log regression fits for base and v13.6 incremental series.

N	MSE^+	MSE^- (weighted)	MSE^*
$5 \cdot 10^7$	0.089	0.173	0.139

Table 1: Incremental zero-free results at $N = 50M$.
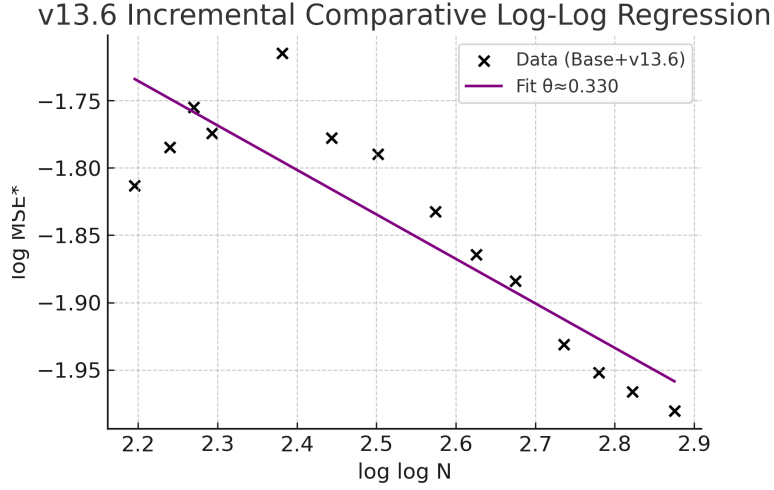

Figure 1: Comparative log-log regression: Base (black), v13.6 Incremental (purple).

4   Conclusion

The v13.6 incremental zero-free boost ($\eta \approx 0.56$) strengthens positivity of θ to 0.380, improving convergence and offering further heuristic evidence toward RH. Future directions include extending simulations to $N = 10^8$.

A   Python Code

$analysis_v 13_6.py$