p-adic Method

No Cover Image

Use `\coverimage{filename}` to add an image

阿巴阿巴!

Contents

1 Interpolation

The main reference of this section is [Poo14]. We first state the main theorem of this section.

Theorem 1.1. Let $\mathbf{k}$ be a complete non-archimedean field of characteristic 0 with $\operatorname{char} \Bbbk_{\mathbf{k}} = p$ and $|p|_{\mathbf{k}} = 1/p$. Suppose that $f \in \mathbf{k}\{\underline{T}\}^d$ satisfies $\|f(\underline{T}) - \underline{T}\| \leq r_p$. Then there exists a function $g \in \mathbf{k}\{\underline{T}, n\}$ such that for each $n \in \mathbb{Z}_{\geq 0}$ and each $\underline{t} \in \mathbf{k}^d$,

$$g(\underline{t}, n) = f^n(\underline{t}).$$

Yang: To be checked.

2 Existence of non-preperiodic points

The main reference of this section is [Ame11]. We first state the main theorem of this section.

Theorem 2.1. Let $\mathbf{k}$ be an algebraically closed field of characteristic 0. Let X be a projective variety defined over $\mathbf{k}$, and let $f : X \dashrightarrow X$ be a dominant rational self-map defined over $\mathbf{k}$. Then there exists a point $x \in X(\mathbf{k})$ such that the forward orbit $O_f(x) = \{f^n(x) : n \geq 0\}$ is well-defined and infinite.

3

References

[Ame11] E Amerik. "Existence of non-preperiodic algebraic points for a rational self-map of infinite order". In: *Mathematical Research Letters* 18.2 (2011), pp. 251–256 (cit. on p. 1).

[Poo14] Bjorn Poonen. "p-adic interpolation of iterates". In: *Bulletin of the London Mathematical Society* 46.3 (2014), pp. 525–527 (cit. on p. 1).

Date: November 12, 2025, **Author**: Tianle Yang, My Homepage