

Hyperbolicity Course Notes

Summer 2024

Lecture 1 — 24, 08, 2024 (draft version 0)

Yi Li

1 Overview

These series of notes summarize the lectures from the short course in August 2024 at Kunming.

Here are the topics that will be discussed in this series of lectures:

1. Classical results on variational Hodge theory,
2. NonAbelian Hodge theory,
3. NonAbelian Hodge theory in non-arithemedean setting,
4. Hyperbolicity and fundamental group representation.

In today's lecture we first introduced the Brody hyperbolicity (resp. Picard hyperbolicity). The major problem is that these notions are not birational invariant. To solve this problem we introduced a weaker notion called psudo-Brody hyperbolicity (resp. pseudo-Picard hyperbolicity). We then presented 4 different facets of the big Picard theorem: Higher dimension big Picard theorem, Baily-Borel theory on bounded symmetric domain, Viehweg-Zuo theory, and fundamental group representation viewpoint. We finished today's lecture by a brief survey on the strong Green-Griffiths-Lang conjecture.

2 Brody hyperbolicity, Picard hyperbolicity

3 Psudo-Brody hyperbolicity, pseudo-Picard hyperbolicity

4 Four facets of the big Picard theorem

5 A brief introduction to the strong Green-Griffiths-Lang conjecture