Demailly-Hacon-Păun's DLT Extension Fall 2025

Note I.4 — 2025 09 12 (draft version 0)

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1 Overview

The aim of this note is try to prove the Hacon-Mckernan's extension theorem. This theorem will be the technical core of the proof of existence of KLT flips. Let us briefly sketch the idea in the proof of the theorem. We will first prove a techinical lemma which allows to lift section after ample twist (which also appears in the algebraic proof of invariance of plurigenera). To prove this lemma, we first observe that by the Serre vanishing theorem the restricted linear series coinside with the linear series of the restriction divisor when twisted with sufficient ample divisor, .

In the second step, we will going to prove the main theorem of this note.

The major references will be [HM10] and [**HaconKovacsBook**]

2 Demailly-Hacon-Paun's DLT extension theorem

In this section we try to prove the de Fernex-Hacon extension theorem.

2.1 Restriction of minimal model program

We will prove the following result about the restriction of MMP step in this section.

Theorem 2.1.

3 Applications of Demailly-Hacon-Păun's extension theorem

The follow theorem shows that a generalized version Demailly-Hacon-Păun's extension is a major step to the proof of the abundance conjecture.

Theorem 3.1.