

# Hypergeometric solutions of elliptic difference equations

Thierry Combet  
 IMB  
 University of Bourgogne  
 Dijon, 21000, France  
 thierry.combot@u-bourgogne.fr

## Abstract

In this presentation, we will present an algorithm to compute hypergeometric solutions of a linear difference equation on an elliptic curve.

## 1 Introduction

Consider an elliptic curve  $\mathcal{C}$  with coefficients in  $\overline{\mathbb{Q}}$  and  $\delta \in \mathcal{C}(\overline{\mathbb{Q}})$  a non torsion point. We consider an elliptic difference equation  $\sum_{i=0}^l a_i(p)f(p \oplus i.\delta) = 0$  with  $\oplus$  the elliptic addition law and  $a_i$  polynomials on  $\mathcal{C}$ . We present an algorithm to compute rational solutions, then an intermediary class we call pseudo-rational solutions, and finally hypergeometric solutions, which are functions  $f$  such that  $f(p \oplus \delta)/f(p)$  is rational over  $\mathcal{C}$ .

## References

- [1] Thierry Combet. Hyperexponential solutions of elliptic difference equations, 29 Apr 2022. <https://arxiv.org/abs/2205.00041>.