



ID de Contribution: 15

Type: Non spécifié

First-order factors of linear Mahler operators by Frédéric Chyzak

lundi 25 septembre 2023 15:00 (1 heure)

Abstract. We develop and compare two algorithms for computing first-order right-hand factors in the ring of linear Mahler operators $\ell_r M_r + \dots + \ell_1 M + \ell_0$ where ℓ_0, \dots, ℓ_r are polynomials in x and $Mx = x b M$ for some integer $b \geq 2$. In other words, we give algorithms for finding all formal infinite product solutions of linear functional equations $\ell_r(x)f(xb^r) + \dots + \ell_1(x)f(xb) + \ell_0(x)f(x) = 0$.

The first of our algorithms is adapted from Petkovšek's classical algorithm for the analogous problem in the case of linear recurrences. The second one proceeds by computing a basis of generalized power series solutions of the functional equation and by using Hermite-Padé approximants to detect those linear combinations of the solutions that correspond to first-order factors.

We present implementations of both algorithms and discuss their use in combination with criteria from the literature to prove the differential transcendence of power series solutions of Mahler equations.