

Complexity of the Creative Telescoping for Bivariate Rational Functions

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(Ongoing work with Alin Bostan, Frederic Chyzak and Ziming Li)

Abstract

The long-term goal initiated in this work is to obtain fast algorithms and implementations for definite integration in the framework, introduced by Almkvist and Zeilberger, of (differential) creative telescoping. Our approach bases on complexity analysis, by obtaining tight degree bounds on the various differential operators and polynomials involved in the method. To make the problem more tractable, we restrict in this work to the integration of bivariate rational functions. Indeed, by considering a more constrained class of inputs, we are able to blend the general method of creative telescoping with the well-known Hermite reduction. We then study a family of combinatorial applications encoded as diagonals of rational formal power series, themselves expressible as integrals.