

Symbolic integration on planar differential foliation

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We consider the problem of symbolic integration of $\int G(x, y(x))dx$ where G is rational and $y(x)$ is a non algebraic solution of a differential equation $y'(x) = F(x, y(x))$ with F rational. As y is transcendental, the Galois action allows to introduce a parameter $I(x, h) = \int G(x, y(x, h))dx$. We will prove that the function I is either differentially transcendental in h or satisfies a linear differential equation in h whose homogeneous part has constant coefficients. We will present an algorithm to compute such equation given a priori bound on their order and coefficient degree.

Keywords

Symbolic integration, creative telescoping, differential equations

References

[1] T. COMBOT; G. CHÈZE, Symbolic Computations of First Integrals for Polynomial Vector Fields. *Foundations of Computational Mathematics* **20**(4), 681–752 (2020).