

Liouvillian integrability and invariant algebraic curves of ordinary differential equations

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In [1] an example of an integrable Liouvillian planar polynomial differential system that has no finite invariant algebraic curves is provided. The present work deals with any general planar polynomial differential system, which can be written as an ordinary differential equation

$$\frac{dy}{dx} = \frac{Q(x, y)}{P(x, y)},$$

with $P(x, y)$ and $Q(x, y)$ real polynomials. We assume that this equation is Liouvillian integrable and determine, in terms of the degree in y of the equation, when this implies that the equation has a finite invariant algebraic curve.

References

[1] J. Giné and J. Llibre, *A note on Liouvillian integrability*, J. Math. Anal. Appl. **387** (2012), 1044–1049.