Invariant algebraic curves for generalized Liénard differential system via Puiseux series

Jaume Giné

Departament de Matemàtica, Universitat de Lleida, Avda. Jaume II, 69; 25001 Lleida, Catalonia, Spain.
`jaume.gine@udl.cat`

Abstract

In this work we solve the problem of finding the invariant algebraic curves of a generalized Liénard differential system $\dot{x} = y$, $\dot{y} = -f(x)y - g(x)$, where $\deg f = m$ and $\deg g = n$ and with $n = m + 1$, generalizing the known previous examples. In particular it is studied the case $m = 3$ and $n = 4$. The difficulties in applying the Puiseux method are shown even when the degrees of the invariant curves are bounded.

Keywords: Liénard systems, invariant algebraic curves, Darboux polynomials, Puiseux series.