



Characterization of the kukles polynomial differential systems having an invariant algebraic curve



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ABSTRACT

Let $f(x)$ and $g(x)$ be complex polynomials. We characterize all Kukles polynomial differential systems of the form

$$x' = y, \quad y' = -y^2 - f(x)y - g(x)$$

having an invariant algebraic curve. We show that expanding an invariant algebraic curve of these differential systems as a polynomial in the variable y , the first four higher coefficients of the polynomial defining the invariant algebraic curve determine completely these Kukles systems. In particular if the second and third higher coefficients of the polynomial defining the invariant algebraic curve satisfy a simple relation between them the invariant algebraic curve is of the form $(y + p(x))^n = 0$ for some polynomial $p(x)$ and $y + p(x) = 0$ is an invariant algebraic curve of the Kukles system for any complex polynomial $f(x)$.

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