Limit cycles of a generalized Liénard differential equation via averaging theory

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We apply the averaging theory of first and second order to the generalized Liénard differential equations. Our main result shows that for any $n, m \geq 1$ there are differential equations of the form $\ddot{x} + \epsilon f(x, \dot{x})\dot{x} + \epsilon^2 g(x, \dot{x})\dot{x} + x = 0$, with f and g polynomials of degree n and m respectively, having at most $[\frac{n}{2}]$ and $max\{[n + \frac{(-1)^{n+1}}{2}], [\frac{m}{2}]\}$ limit cycles using the averaging theory of first and second order respectively.

References

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