Existence and uniqueness of limit cycles for generalized φ-laplacian Liénard equations

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Liénard equation,

$$x'' + f(x)x' + g(x) = 0,$$

appears as a simplified model in many problems of science and engineering. Since the first half of 20th century, many papers have appeared giving existence and uniqueness conditions for the limit cycles that a Liénard equation exhibits.

In [1], we extend some of these results for the case of the generalized φ-laplacian Liénard equation

$$(\varphi(x'))' + f(x)\psi(x') + g(x) = 0.$$

This generalization appears when other derivations, different from the classic one, are considered, such as the relativistic one. Our results apply, for example, to the relativistic van der Pol equation

$$\left(\frac{x'}{\sqrt{1 - \frac{x^2}{c^2}}}\right)' + \mu(x^2 - 1)x' + x = 0.$$

References

[1] S. Pérez-González, J. Torregrosa and P. J. Torres. *Existence and Uniqueness of limit cycles for generalized φ-laplacian Liénard equations*. Preprint, 2012.