



## A new algorithm for the computation of the Lyapunov constants for some degenerated critical points

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### Abstract

The center problem for degenerated monodromic critical points is far to be solved in general. In this paper we give a procedure to solve it for a particular perturbation of critical points which dominant part near the critical point is  $x^{2n-1} \frac{\partial}{\partial x} + y^{2m-1} \frac{\partial}{\partial y}$ . For these critical points the problem is solved by writing its associated differential equation in the generalized polar coordinates introduced by Lyapunov and by developing a new method of computation of the so called generalized Lyapunov constants. This method is based into the transformation of the differential equation into the perturbation of a Hamiltonian system. Finally, the method is applied to solve the center and the stability problem for a particular family of differential equations.

*Key words:* center point, generalized Lyapunov constants

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### 1 Introduction and Main Results

Remember that the so called stability problem and the center problem can be solved for smooth non degenerated critical points via the Lyapunov constants. On the other hand the same problem but for arbitrary monodromic critical points is far to be solved in general. This paper will deal with a new method for solving the above mentioned problems for a special kind of planar degenerated critical points. This method is based into a different way of computing the so called generalized Lyapunov constants, see [1]. Before state our results we need to introduce some well known definitions.

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