DIFFERENTIAL EQUATIONS DEFINED BY THE SUM OF TWO QUASI-HOMOGENEOUS VECTOR FIELDS

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ABSTRACT. In this paper we prove, that under certain hypotheses, the planar differential equation: $\dot{x} = X_1(x,y) + X_2(x,y)$, $\dot{y} = Y_1(x,y) + Y_2(x,y)$, where $(X_i, Y_i), i = 1, 2$, are quasi-homogeneous vector fields, has at most two limit cycles. The main tools used in the proof are the generalized polar coordinates, introduced by Lyapunov to study the stability of degenerate critical points, and the analysis of the derivatives of the Poincaré return map. Our results generalize those obtained for polynomial systems with homogeneous non-linearities.

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