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Limit cycles of discontinuous piecewise differential systems formed by linear centers in $\mathbb{R}^2$ and separated by two circles

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ABSTRACT

We show that discontinuous planar piecewise differential systems formed by linear centers and separated by two concentric circles can have at most three limit cycles. Usually is a difficult problem to provide the exact upper bound that a class of differential systems can exhibit. Here we also provide examples of such systems with zero, one, two, or three limit cycles.

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1. Introduction and statement of the main result

In the qualitative theory of the differential systems in $\mathbb{R}^2$ one of the main difficult objects to study are the limit cycles. Recall that a *limit cycle* is an isolated periodic solution in the set of all periodic solutions of the differential systems, see for instance the second part of the famous 16th Hilbert problem [1–3].

The study of piecewise linear discontinuous differential systems started with Andronov, Vitt and Khaikin in [4]. Due to the fact that these systems model many real phenomena and different modern devices, they have became a topic of great interest these last twenty years. For more details see for instance the books [5,6] and the references therein.

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