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Bautin's theorem

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There are at most three limit cycles which can appear in the following quadratic system

$$\dot{x} = p(x, y) = \sum_{i+j=0}^{2} a_{ij} x^i y^j$$

$$\dot{y} = q(x, y) = \sum_{i+j=0}^{2} b_{ij} x^i y^j$$

from a singular point, if its type is either a focus or a center.

In 1939 N.N. Bautin claimed the above result and in 1952 submitted the proof [**?**]. [**?**]

References

[GAV] Gaiko, A., Valery: Global Bifurcation Theory and Hilbert's Sixteenth Problem. Kluwer Academic Publishers, London, 2003.

[BNN1] Bautin, N.N.: On the number of limit cycles appearing from an equilibrium point of the focus or center type under varying coefficients. Matem. SB., 30:181-196, 1952. (written in Russian)

[BNN2] Bautin, N.N.: On the number of limit cycles appearing from an equilibrium point of the focus or center type under varying coefficients. Translation of the American Mathematical Society, 100, 1954.