Françoise, Jean-Pierre; Gavrilov, Lubomir
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34C07 Theory of limit cycles of polynomial and analytic vector fields (existence, uniqueness, bounds, Hilbert’s 16th problem and ramifications) for ordinary differential equations
37F75 Dynamical aspects of holomorphic foliations and vector fields
34M35 Singularities, monodromy and local behavior of solutions to ordinary differential equations in the complex domain, normal forms

Keywords:
double centers; iterated integrals; bautin ideal; bifurcation function; limit cycles

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References:
[1] Bautin, N. N., Du nombre de cycles limites en cas de variation de coefficients d’un état d’équation du type foyer ou centre, Dokl. Akad. Nauk USSR24 (1939) 609-672. - Zbl 65.1263.02
[2] N. N. Bautin, On the number of limit cycles which appear with the variation of the coefficients from an equilibrium point of focus or center type, Amer. Math. Soc. Transl. Ser. B (1962) 396-413. (Russian Original: Mat. Sb.30 (1952) 181-196).
[3] Briskin, M., Roytvarf, N. and Yomdin, Y., Center conditions at infinity for Abel differential equations, Ann. of Math. (2)172(1) (2010) 437-483. - Zbl 1216.34045
[4] Chicone, C. and Jacobs, M., Bifurcation of limit cycles from quadratic isochrones, J. Differential Equations91(2) (1991) 268-326. - Zbl 0733.34045
[5] Chow, S.-N., Li, C. Z. and Wang, D., Normal Forms and Bifurcation of Planar Vector Fields (Cambridge University Press, Cambridge, 1994), pp. viii+472. - Zbl 0883.34035
[6] Chow, S. N., Li, C. and Yi, Y., The cyclicity of period annuli of degenerate quadratic Hamiltonian systems with elliptic segment loops, Ergodic Theory Dynam. Systems22(2) (2002) 349-374. - Zbl 1094.34018
[7] Christopher, C. and Li, C., Limit Cycles of Differential Equations, (CRM Barcelona, Birkhäuser Verlag, Basel, 2007), pp. viii+171. - Zbl 1359.34001
[8] Dulac, H., Détermination et intégration d’une certaine classe d’équations différentielles ayant pour point singulier un centre, Bull. Sci. Math. Sér. 232 (1908) 230-252. - Zbl 39.0374.01
[9] Dumortier, F., Li, C. and Zhang, Z., Unfolding of a quadratic integrable system with two centers and two unbounded heteroclinic loops, J. Differential Equations135(1) (1997) 146-193. - Zbl 0883.34035
[10] Françoise, J.-P., Successive derivatives of a first return map, application to the study of quadratic vector fields, Ergodic Theory Dynam. Systems16(1) (1996) 87-96. - Zbl 0852.34008
[11] Françoise, J.-P., Gavrilov, L. and Xiao, D., Hilbert’s 16th problem on a period annulus and Nash space of arcs, Math. Proc. Camb. Phil. Soc.169 (2020) 377-409. - Zbl 0705.34011
[12] Françoise, J.-P. and Pelletier, M., Iterated integrals, Gelfand-Leray residue, and first return mapping, J. Dyn. Control Syst.12(3) (2006) 357-369. - Zbl 1108.37043
[13] Françoise, J.-P. and Yang, P., Quadratic double centers and their perturbations, J. Differential Equations271 (2021) 563-593. - Zbl 1462.34050
[14] Francoise, J.-P. and Yomdin, Y., Bernstein inequalities and applications to analytic geometry and differential equations, J. Funct. Anal.146(1) (1997) 185-205. - Zbl 0869.34008
[15] Garibay, A., Gasull, A. and Jarque, X., Simultaneous bifurcation of limit cycles from two nests of periodic orbits, J. Math. Anal. Appl.341(2) (2008) 813-824. - Zbl 1144.34027
[16] Gavrilov, L., The infinitesimal 16th Hilbert problem in the quadratic case, Invent. Math.143(3) (2001) 449-497. - Zbl 0979.34018
[17] Gavrilov, L., Higher order Poincaré-Pontryagin functions and iterated path integrals, Ann. Fac. Sci. Toulouse Math.XIV (2005) 663-682. - Zbl 1104.34014
[18] Gavrilov, L., Cyclicity of period annuli and principalization of Bautin ideals, Ergodic Theory Dynam. Systems28(5) (2008) 1497-1507. - Zbl 1172.37020
[19] Gavrilov, L. and Iliev, I. D., The displacement map associated to polynomial unfoldings of planar Hamiltonian vector fields,
[20] Gavrilov, L. and Iliev, I. D., Perturbations of quadratic Hamiltonian two-saddle cycles, Ann. Inst. H. Poincaré Anal. Non Linéaire32(2) (2015) 307-324. - Zbl 1374.34131

[21] Iliev, I. D., Perturbations of quadratic centers, Bull. Sci. Math.122(2) (1998) 107-161. - Zbl 0920.34037

[22] Illyashenko, Y. and Yakovenko, S., Lectures on Analytic Differential Equations, , Vol. 86 (American Mathematical Society, Providence, RI, 2008). - Zbl 1186.34001

[23] M. Hall Jr., The Theory of Groups (Dover Publications, Mineola, NY, 1959). Reprint of the 1959 Original Published by Macmillan Company. Original Published by Macmillan Company edition (2018).

[24] Li, C., Planar quadratic systems possessing two centers (Chinese), Acta Math. Sin.28(5) (1985) 644-648. - Zbl 0581.34025

[25] Li, C., Li, W., Llibre, J. and Zhang, Z., Linear estimate for the number of zeros of abelian integrals for quadratic isochronous centres, Nonlinearity13(5) (2000) 1775-1800. - Zbl 0999.34032

[26] Li, C. and Llibre, J., Quadratic perturbations of a quadratic reversible Lotka-Volterra system, Qual. Theory Dyn. Syst.9(1-2) (2010) 235-249. - Zbl 1213.34071

[27] Mardešić, P., Novikov, D., Ortiz-Bobadilla, L. and Pontigo-Herrera, J., Infinite orbit depth and length of Melnikov functions, Ann. Inst. Henri Poincaré Anal. Non Linéaire36(7) (2019) 1941-1957. - Zbl 1435.37086

[28] Neto, A. L., Foliations with a Morse center, J. Singul.9 (2014) 82-100. - Zbl 1333.37064

[29] Roussarie, R., Bifurcation of Planar Vector Fields and Hilbert's Sixteenth Problem, , Vol. 164 (Birkhäuser Verlag, Basel, 1998), pp. xviii+204. - Zbl 0898.58039

[30] Roussarie, R., Melnikov functions and Bautin ideal, Qual. Theory Dyn. Syst.2(1) (2001) 67-78. - Zbl 1081.37030

[31] Schlomiuk, D., Algebraic particular integrals, integrability and the problem of the center, Trans. Amer. Math. Soc.338(2) (1993) 799-841. - Zbl 0777.58028

[32] Żoładek, H., Quadratic systems with center and their perturbations, J. Differential Equations109 (1994) 223-273. - Zbl 0797.34044

[33] Żoładek, H., Melnikov functions in quadratic perturbations of generalized Lotka-Volterra systems, J. Dyn. Control Syst.21(4) (2015) 573-603. - Zbl 1333.34051

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