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The Poincare's center problem

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The center problem concerns real plane vector fields of the form $\dot{x} = -y + f(x, y)$, $\dot{y} = x + g(x, y)$ where f, g are polynomials with second order zero at $x = y = 0$. One asks about conditions on f, g that the critical point $x = y = 0$ is a center. There exists a conjecture that any such system with center is either algebraically reversible or is integrable in quadratures.

In the paper [1] a natural generalization of the center problem to the case of complex differential systems is studied. I will present two examples from [1] which demonstrate that the real and complex cases are essentially different.

- [1] J. Llibre and H. Żołądek, The Poincare's center problem, *J. Dynam. Control Syst.*, in press.