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Arbitrary order bifurcations for perturbed Hamiltonian planar systems via the reciprocal of an integrating factor

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1. Introduction and statement of the main results

In this paper we deal with planar systems of the form

$$\dot{x} = P(x, y, \varepsilon) = \frac{\partial H}{\partial y}(x, y) + \sum_{k=1}^{\infty} \varepsilon^k f_k(x, y),$$

$$\dot{y} = Q(x, y, \varepsilon) = -\frac{\partial H}{\partial x}(x, y) + \sum_{k=1}^{\infty} \varepsilon^k g_k(x, y), \tag{1}$$

where H, f_k and g_k depend analytically on their variables in an open subset U, ε is a small parameter, and the system has a center at the origin when $\varepsilon = 0$. A center is an isolated singular point surrounded by a continuous family of periodic or closed orbits. As usual, the dot denotes derivative with respect to the time variable t. We say that system (1) with $\varepsilon = 0$ is the *unperturbed* system, while system (1) with $\varepsilon \neq 0$ is the *perturbed* one.

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