Bifurcation theory of limit cycles by higher order Melnikov functions and applications

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In this paper, we study Poincaré, Hopf and homoclinic bifurcations of limit cycles for planar near-Hamiltonian systems. Our main results establish Hopf and homoclinic bifurcation theories by higher order Melnikov functions, obtaining conditions on upper bounds and lower bounds of the number of limit cycles. As an application, we concern a cubic near-Hamiltonian system, and study Hopf and homoclinic bifurcation in detail.