Mathematics > Dynamical Systems

On Degenerate Planar Hopf Bifurcations

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Our concern is the study of degenerate Hopf bifurcation of smooth planar dynamical systems near isolated singular points. To do so, we propose to split up the definition of degeneracy into two types. Degeneracy of first kind shall means that no limit cycle surrounding the steady state can emerge after or before the critical point, with the possible emergence of limit cycles surrounding the point at infinity. Degeneracy of second kind shall means that either several limit cycles or semistable cycles as a limiting case, emerge surrounding the steady state super or subcritically. In degenerate bifurcation of second kind we also show that the radius of the emerging cycle tends to zero with an "anomalous" order as the bifurcation parameter tends to the critical value. Finally, we give a sufficient condition for degenerate bifurcations of second kind up to 6-jet-equivalence, and show some "typical" forms for degenerate bifurcations.

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