
Characteristic box dimension of Poincaré map of nilpotent focus

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Abstract

We show how box dimension of an orbit generated by the Poincaré map or by the unit-time map, can be used in studying the cyclicity problem of nilpotent singularities of planar vector fields. On the characteristic curve of nilpotent singularity we define characteristic map and characteristic box dimension in order to obtain multiplicity of the singularity. In the case of Hopf-Takens bifurcation or saddle-node bifurcation, there is already known connection between the multiplicity of singularity and the box dimension of the Poincaré map or unit-time map. We generalize that results for nilpotent singularities. The box dimension of the Poincaré map near the nilpotent focus on the characteristic curve reveals the upper bound for cyclicity.

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