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The nondegenerate center problem and the inverse integrating factor

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Abstract

In this paper we study some aspects of the nondegenerate center problem for analytic and, in particular, for polynomial vector fields. The relation between the existence of an inverse integrating factor and the center problem is studied. The relationship between the conditions for a center using the Poincaré formal series and the inverse integrating factor formal series for systems with a linear center perturbed by homogeneous polynomials is proved.

MSC: primary 34A05; secondary 34C05, 34C25

Keywords: Center problem; Inverse integrating factor; Nonlinear differential equations

1. Introduction

One of the classical problems in the qualitative theory of planar analytic differential systems is to characterize the local phase portrait at an isolated singular point. This problem has been solved except if the singular point is of focus-center type, see [1,2,13]. Recall that a singular point is said to be of focus-center type if it is either a focus or a center. The problem of distinguishing between a center or a focus is called the *center problem*. Of course, if the linear part of the singular point

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