The Center Problem on a Center Manifold in $\mathbb{R}^3$

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Abstract

Fix a collection of polynomial vector fields on $\mathbb{R}^3$ with a singularity at the origin, for every one of which the linear part at the origin has two pure imaginary and one non-zero eigenvalue. We show that the set of such systems having a center on the local center manifold at the origin corresponds to a variety in the space of admissible coefficients. We explicitly compute it for several families of systems with quadratic higher order terms.

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