
Holomorphic normal form of nonlinear perturbations of nilpotent vector fields

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Abstract

We consider the problem of transformation to a normal form of germ of holomorphic nonlinear perturbations of a nilpotent linear vector field in $(\mathbb{C}^n, 0)$, $n \geq 2$. In dimension $n = 2$, every such vector field is analytically conjugated to its Takens normal form (Stróżyńska-Żoładek theorem) and such a statement is known to be false in dimension $n > 2$. We give a sufficient condition that ensures that there exists a germ of holomorphic transformation to a normal form of a germ of holomorphic nonlinear perturbation of a nilpotent linear vector field in $(\mathbb{C}^n, 0)$, $n > 2$. Our proof is based on $\mathfrak{sl}_2(\mathbb{C})$ -representations and a general notion of normal form.

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