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ON THE LINEARIZATION OF VECTOR FIELDS ON A TORUS WITH PRESCRIBED FREQUENCY

Dongfeng Zhang — Xindong Xu

Abstract. In this paper we are mainly concerned with the linearization of the flow with prescribed frequency for analytic perturbation of constant vector fields on a torus under weaker non-degeneracy condition and non-resonant condition. As is well known the perturbation of constant vector fields may induce a shift of frequency, when Kolmogorov's non-degeneracy condition is violated. By introducing external parameters and using the polynomial structure to truncate, we prove that if the frequency mapping has the nonzero Brouwer's topological degree at some non-resonant frequency, then the conjugated vector fields will have a linear flow with this frequency.

1. Introduction and main results

KAM theory was founded by A.N. Kolmogorov, V.I. Arnold and J. Moser [1], [10], [12] as a powerful tool to deal with the problem of small denominator and small perturbation of conservative systems. Due to its importance in dynamical systems, KAM theory has been extensively applied to Hamiltonian, reversible, volume preserving, and general (dissipative) systems.

In this paper we consider a vector field with parameters $X = N + P$, where $N = \omega(\xi)$ denotes a constant vector on the n-torus $\mathbb{T}^n = \mathbb{R}^n/2\pi\mathbb{Z}^n$, describing

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