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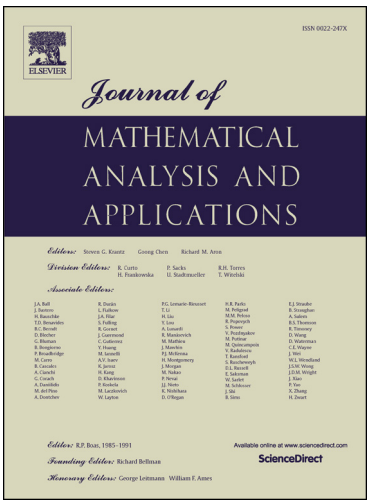

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Boundedness in forced isochronous oscillators[1]

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Abstract

In this paper we are concerned with the boundedness of all solutions for the forced isochronous oscillator

$$x'' + V'(x) + g(x) = f(t),$$

where V is a so-called T-isochronous potential, the perturbation g is assumed to be bounded, and the 2π-periodic function $f(t)$ is smooth. Using the resonant small twist theorem and averaged small twist theorem established by Ortega, we will prove the boundedness of all solutions for the above forced isochronous oscillator in the resonant and non-resonant cases under some reasonable assumptions, respectively.

Keywords: Boundedness; Forced isochronous oscillators; Resonant small twist theorem; Averaged small twist theorem.

1. Introduction

In this paper we are concerned with the boundedness of all solutions for the forced isochronous oscillator

$$x'' + V'(x) + g(x) = f(t), \tag{1.1}$$

where V is a so-called T-isochronous potential, the perturbation g is bounded, and the 2π-periodic function $f(t)$ is smooth. The origin $(x, y) = (0, 0)$ is called an isochronous center of the system

$$x' = y, \quad y' = -V'(x), \tag{1.2}$$

if every solution of system (1.2) is periodic with the minimal period $T > 0$. Meanwhile, the equation

$$x'' + V'(x) = 0 \tag{1.3}$$

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