



# Adaptive Synchronization for Oscillators in $\phi^6$ Potentials

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**Abstract:** In this paper, we investigate adaptive synchronization for multi-parameter oscillators with  $\phi^6$  potentials. We consider the synchronization for known and unknown system parameters for the  $\phi^6$  Van-der Pol and Duffing oscillator based on a simple adaptive control technique; and show that a single-state adaptive feedback is sufficient to steer two identical oscillators to stable synchronization. We obtain some estimates of the unknown parameters for both systems and present numerical simulations to show the effectiveness of our approach.

**Keywords:** *synchronization; adaptive control;  $\phi^6$  oscillators.*

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## 1 Introduction

The synchronization of chaotic oscillator is an intriguing phenomenon that has received considerable research attention during the last two decades. The increasing and enormous research activities on chaos synchronization is partly motivated by several promising real life applications; spanning areas such as secure communications, chaos generators design, chemical reactions, lasers, biological systems, information science, neural networks, etc [1–7]. For this reason, the study of chaos synchronization has grown rapidly since its discovery in 1990 by Pecora and Carroll [1]; and a wide variety of linear and nonlinear approaches have been proposed and well developed for achieving specific synchronization

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