Output Synchronization of Chaotic Systems: Model-Matching Approach with Application to Secure Communication

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Abstract: In this paper, a method for synchronizing chaotic systems in continuous-time is presented. The approach, which exploits the model-matching problem from nonlinear control theory, is advantageously applied to achieve complete synchronization and output synchronization of identical and nonidentical chaotic systems, respectively. Some potential applications to secure communication for audio and binary information signals are also given.

Keywords: Chaos synchronization; model-matching problem; encryption; secure communication.


1 Introduction

Undoubtedly, data security has been an issue of increasing importance in communications as the Internet and personal communication systems are being made accessible world-wide. Recently, increasing efforts have been made to use chaotic systems for enhancing some features of communication systems. In particular, chaotic synchronization to design secure communication systems. Chaos and cryptography have some common features, the most prominent being extremely sensitivity to parameter changes. Chaos has already been used to design cryptography systems [9]. One common feature of most existing chaos-based secure communication schemes is that a chaotic signal is used for

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