论文

归一化峰度及其在弱非线性系统盲辨识中的应用

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摘要：

本文主要研究信号的归一化峰度及其在弱非线性系统辨识中的应用策略问题。首先简要介绍了几类常见的无记忆/有记忆非线性模型及其表示方法；给出了信号的归一化峰度定义及重要性质；在此基础上，分别针对非线性系统的记忆效应和非线性阶数对系统输出信号归一化峰度的影响进行了理论推导和仿真分析，揭示了该参数随系统特性的变化规律，表明归一化峰度具备精确辨识弱非线性系统的潜力。最后，针对SFDR(无杂散动态范围)高达85dBFS(dB Full Scale)的弱非线性系统，本文提出了一种分步辨识的方法，并结合所提出的方法阐明了此规律对于弱非线性系统盲辨识和失真补偿的潜在应用价值及其精度优势。

关键词： 归一化峰度 弱非线性 记忆效应 非线性阶数 系统辨识

Normalized Kurtosis and Its Application in Blind Identification of Weak Nonlinear system

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Abstract:

This paper studies the normalized kurtosis and its application in blind identification of weak nonlinear system. First of all, some commonly used nonlinear models with or without memory are briefly introduced; then this paper presents the definition of normalized kurtosis and its some useful properties in system identification; according to the definition and properties, the influences of memory depth and nonlinear order on normalized kurtosis are derived theoretically, and simulation result demonstrates the rule of normalized kurtosis varying with the change of system characteristics. This shows that normalized kurtosis has the ability to identify weak nonlinear system accurately. Accordingly, this paper proposes a step by step method to blindly identify extremely weak nonlinear system whose SFDR(Spurs Free Dynamic Range) is up to 85dBFS(dB Full Scale) by using normalized kurtosis. Finally, combined with the proposed method, this paper analyzes the potential value and accuracy advantage in blindly identifying and compensating the weak nonlinear system.

Keywords: Normalized kurtosis weak nonlinear system memory effect nonlinear order system identification

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