

一种基于模糊熵的混沌伪随机序列复杂度分析方法

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A New Complexity Metric of Chaotic Pseudorandom Sequences Based on Fuzzy Entropy

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摘要

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摘要 该文将模糊理论引入到混沌伪随机序列复杂度测度中,构造了用于序列复杂度测度的模糊隶属函数,并在此基础上研究了一种新的基于模糊熵(Fuzzy Entropy, FuzzyEn)的混沌伪随机序列复杂度测度。仿真结果表明,与现有主要的混沌伪随机序列复杂度测度方法相比较, FuzzyEn测度不仅能够有效地测度出不同复杂度的混沌伪随机序列,而且具有更加好的对序列符号空间的适用性,更加小的对测量维度的敏感性以及更强的对分辨率的鲁棒性。

关键词: 混沌伪随机序列 模糊熵 复杂度

Abstract: Importing the concept of fuzzy set, this paper constructs membership function for measuring the complexity of chaotic pseudorandom sequences. On the basis of this, a new complexity metric is investigated to evaluate the unpredictability of the chaotic pseudorandom sequences based on the Fuzzy Entropy (FuzzyEn). Simulations and analysis results show that, the FuzzyEn works effectively to discern the changing complexities of the chaotic pseudorandom sequences, and compared with complexity metric based on the Approximate Entropy (ApEn) and symbolic dynamics approach, FuzzyEn has obvious advantages in the applicability of symbolic space, the sensitivity of vector dimension and the robustness of resolution parameter.

Keywords: Chaotic pseudorandom sequences Fuzzy Entropy (FuzzyEn) Complexity

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