

基于顺序统计的窄带通信辐射源指纹特征抽取方法

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A Novel Method Based on Order Statistics for Extracting Fingerprint of Narrow Band Emitter

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摘要

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摘要 该文提出将窄带射频功率放大器的静态非线性特性作为窄带无线通信设备的“指纹”特征。为了在未知放大器输入的前提下提取特征量,首先建立静态非线性的Hammerstein模型,然后分白化采样信号和估计泰勒级数的系数两个步骤提取特征。应用顺序统计的方法将白化信号转换为单调递增序列,通过最小二乘法对顺序统计结果做线性回归,得到泰勒级数的系数并作为个体特征量。通过数值仿真的方法提取了4种射频功率放大器模型的指纹特征,结果表明该文所提出的算法能够在特征空间中有效地识别不同的窄带射频功放。

关键词: 窄带通信 指纹识别 顺序统计 非线性

Abstract: The static nonlinear feature of narrow band Radio Frequency Power Amplifier (RF PA) is made as the fingerprint of wireless communication emitter. RF PA with unknown input can be looked as a static nonlinear Hammerstein model. The process of feature extraction from this model is split into two steps. The first step is signal samples whitening and the second is the estimation of Taylor series' coefficients. The order statistics of the whitening signal samples is monotone. Then the features are estimated through linear regression using least square method. Comparing feature vectors of 4 RF power amplifiers results in that the proposed algorithm is effectively to identification different type of power amplifiers.

Keywords: Narrow band communications Recognition of fingerprint Order statistics Nonlinear

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