

电子技术

非带限冲激信号的一种低通采样和重建方法

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摘要:

提出了非带限冲激信号的一种低通采样和重建方法, 将冲激信号通过低通滤波器后, 按照信号新息率进行采样, 然后对采样得到的离散时间信号进行傅里叶变换, 采用最小二乘零化滤波算法可以准确地重建原始冲激信号。在冲激信号个数较大及受到噪声影响时, 最小二乘零化滤波算法性能恶化, 通过适当提高采样率, 使用奇异值分解重建算法, 可以获得理想的重建结果。分析和仿真结果证明, 所提出的非带限冲激信号低通采样和重建方法, 能够以较低的速率进行采样和恢复原始冲激信号, 并具有良好的抗噪声性能。

关键词: 非带限冲激信号 采样和重建 新息率 零化滤波\奇异值分解

Lowpass sampling and reconstruction method for non-bandlimited impulse signals

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Abstract:

A lowpass sampling and reconstruction method for aperiodic non-bandlimited impulse signals is proposed. The impulse signals are passed through a lowpass filter and sampled at the rate of innovation. The sampled discrete time signals are transformed to frequency domain, from which the spectrum coefficients of original impulses are obtained. Then the amplitudes and time shifts of the impulses are found by a least square annihilating filter (LSAF) method. In the presence of noise, the LSAF method will suffer from performance loss. The only way to improve the reconstruction results is to increase the sampling rate and use the singular value decomposition (SVD) reconstruction method. Simulation results show that the proposed sampling and reconstruction methods achieve very good reconstruction results in the presence of noise at the low sampling rate.

Keywords: non-bandlimited impulse signal sampling and reconstruction rate of innovation annihilating filter singular value decomposition

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