

算法研究

一种基于二进小波变换的短波语音抗时变干扰算法

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摘要:

本文针对短波语音中存在的时变干扰难以跟踪, 更难以滤除的问题, 提出了一种基于二进小波变换的抗时变干扰算法, 利用二进小波变换的变焦距的功能以及保持语音信号连续性的特点将短波语音信号分解成各层小波系数, 由于噪声、语音和时变干扰在不同尺度上小波变换后, 其小波变换系数和尺度大小的特性关系存在着不同的特征表现, 因此通过二进小波变换能够有效地将时变干扰分解到很少的小波系数上, 然后结合后验信噪比的大小以及根据人耳的听觉掩蔽特性, 将强干扰和弱干扰、重叠干扰和非重叠干扰分开处理, 较好地滤除了时变干扰并且明显降低了对短波语音信号的失真。仿真表明此算法不仅能够较好地滤除时变干扰, 并且对语音失真较小, 要明显优于传统的陷波算法。

关键词: 时变干扰; 二进小波变换; 后验信噪比; 干扰估计; 干扰滤除

Research for the Anti-time-varying Interference in Speech Signal of Short-Wave Based on Wavelet Transform

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Abstract:

The shortwave narrow-band interference in speech communication is time-varying so that it is more difficult to filter out for hard adaptive tracking. The article designed a kind of algorithm to resist time-varying interference based on discrete dyadic wavelet transform, which analysis the speech signal in time-frequency domain on the high resolution and keep the speech signal continuity. There are different characteristics in the relationship of wavelet transform coefficients and scale when the speech signal, the random noise and time-varying interference are transformed on different scales. In wavelet domain the speech signal is decompose, the time-varying interference is efficaciously concentrated to partial weighted vector. Consequently we could deal with signal and interference differently, to achieve good tracking of and filtering the time-varying interference. We take into account the posteriori SNR of the speech signal, and also could deal with the serious interference, feeble interference, overlapped interference and non-overlapped interference differently, all of these are to depress voice distortion. Simulation results show that this algorithm is able to track the time-varying interference, filter the time-varying interference and result out voice distortion smaller, all of these are notch superior to the traditional algorithm.

Keywords: time-varying interference discrete dyadic wavelet transform posteriori SNR interference estimation, interference rejection

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