

网络、通信与安全

OFDM系统中基于离散余弦变换的信道估计

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摘要 提出了两种基于离散余弦变换(DCT)的信道估计方法,适用于多径衰落正交频分复用(OFDM)系统。利用DCT的能量压缩特性,能有效消除传统基于离散傅立叶变换(DFT)估计算法在信道延时不是采样周期整数倍,或系统子载波数不等于有用子载波数时产生的频谱泄漏。根据DCT与DFT的等效关系,通过构造不同的对称数据序列,推出两种相应的基于DCT信道估计,其中一种具有更好的性能,另一种更利于实现。仿真和分析结果表明:在多径衰落信道下,两种基于DCT的方法能有效降低频谱泄漏造成的信道估计误差,具有比基于DFT方法更好的性能。

关键词 [离散余弦变换](#) [信道估计](#) [正交频分复用](#) [离散傅立叶变换](#)

分类号

Channel Estimation Based on Discrete Cosine Transform for OFDM Systems

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Abstract

Two channel estimation methods based on discrete cosine transform (DCT) were proposed for orthogonal frequency division multiplexing (OFDM) systems in multi-path fading channel. Due to the energy compaction properties of DCT, spectral leakage of conventional discrete-time Fourier transform (DFT)-based estimation could be mitigated when the path delays aren't integer multiples of sampling period, or when not all sub-carriers are used. According to the equivalent relationship between DCT and DFT, two corresponding DCT-based channel estimators were obtained by defining the different symmetric data sequences. Of two DCT-based methods, one has a better performance, while the other has the advantage of easy realization. Theoretical analysis and computer simulation results show that both proposed algorithms can reduce the channel estimation error, caused by the spectral leakage, and outperform the conventional DFT-based channel estimation in multi-path fading channel.

Key words [Discrete Cosine Transform](#) [Channel Estimation](#) [Orthogonal Frequency Division Multiplexing](#) [Discrete-time Fourier Transform](#)

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