

## 电子技术

### 用于有虚载波OFDM系统的信道估计算法

张阳, 李建东, 庞立华, 陈丹

(西安电子科技大学综合业务网理论及关键技术国家重点实验室, 陕西 西安 710071)

#### 摘要:

提出了一种适用于有虚载波的正交频分复用系统的改进信道估计算法。由于传统的信道估计器无法估计虚载波处的信道传输函数, 从而逆离散傅里叶变换导致信道能量泄漏, 使得时域滤波方法不能直接应用。为了解决这个问题, 利用信道冲激响应的有限性, 推导了以最小二乘法(least square, LS)来估计虚载波处的信道传输函数。进一步观察信号子空间和噪声子空间中噪声的相关性, 使用最大后验概率准则估计出信号子空间的噪声并消除其带来的估计误差。该算法不仅可在训练模式下应用, 也可推广应用于基于判决反馈的跟踪模式。仿真结果表明, 改进算法无误符号率平台效应, 且其误符号率较传统LS算法有2 dB的信噪比增益。

关键词: 正交频分复用 信道估计 最大后验概率 虚载波

### Channel estimation for OFDM systems with virtual carriers

ZHANG Yang, LI Jian-dong, PANG Li-Hua, CHEN Dan

(State Key Laboratory of Integrated Service Networks, Xidian Univ., Xi'an 710071, China)

#### Abstract:

An improved channel estimation algorithm for orthogonal frequency division multiplexing (OFDM) systems with virtual carriers is proposed. As conventional estimator cannot estimate the channel transfer function (CTF) at virtual carriers, which makes channel energy leakage after inverse discrete Fourier transform, and the time domain filtering method is not directly applicable. To circumvent this problem, the least square (LS) method is applied to estimate the CTF at virtual carriers by using the limitation of channel impulse response (CIR). Further, by exploiting the noise correlativity between signal subspace and noise subspace, the maximum a posterior probability (MAP) criterion is applied to estimate the noise in signal subspace and then the estimation error brought by it is also suppressed. In addition to the training mode, the proposed method can also be extended and used in the tracking mode with decision aided feedback. Simulation results show that the improved scheme is free of symbol error rate (SER) floor, and its SER attains 2 dB signal-to-noise ratio gains compared with that of regular LS estimator.

Keywords: orthogonal frequency division multiplexing (OFDM) channel estimation maximum a posterior probability (MAP) virtual carrier

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通讯作者:

作者简介:

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